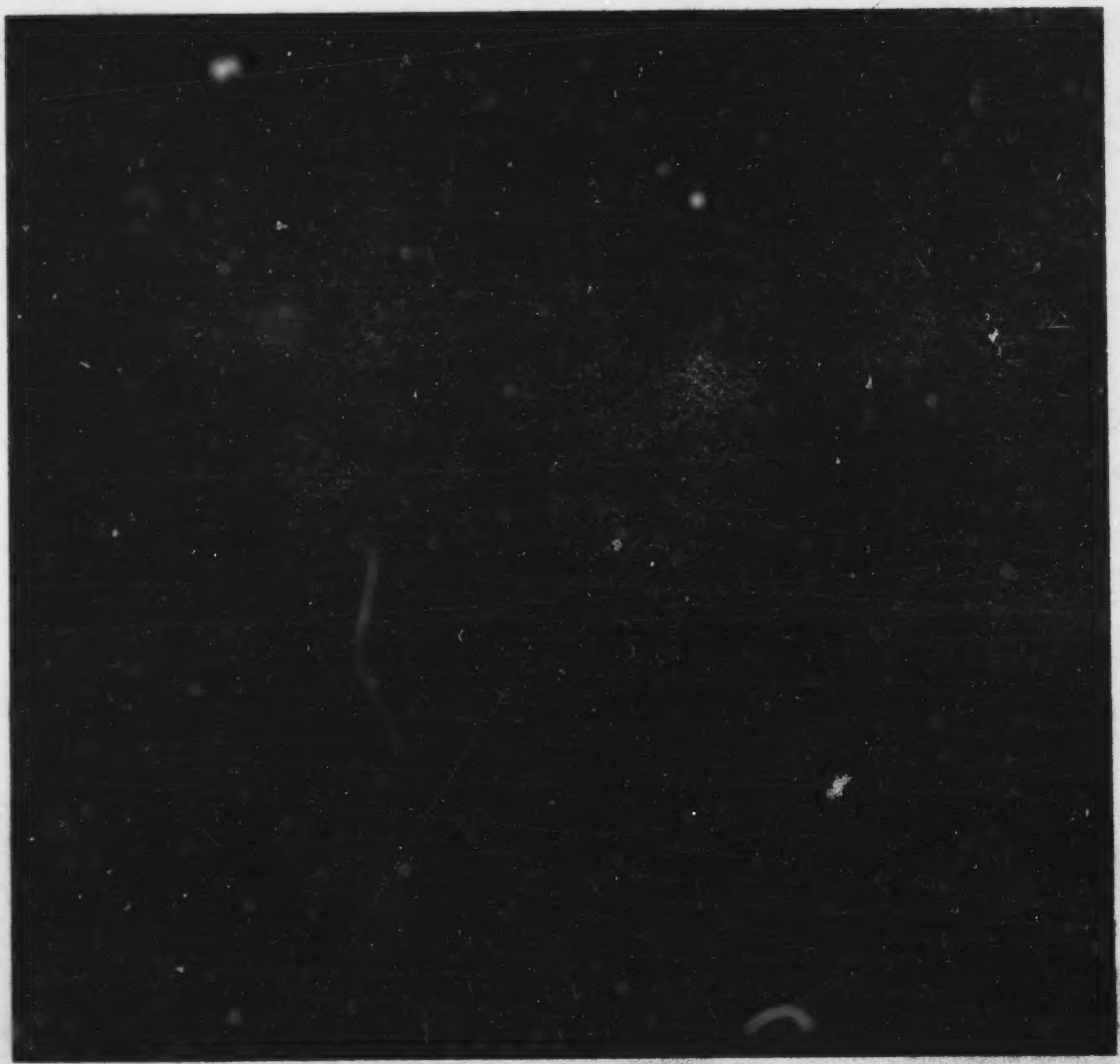
17

Occasional Papers in Archaeology and History

Cahiers d'archéologie et d'histoire

Canadian Historic Sites
Lieux historiques canadiens



Indian and
Northern Affairs

Affaires indiennes
et du Nord

Issued under the authority of the Honourable Warren Allmand, Minister of Indian and Northern Affairs

Compiled and edited by the Research Division, National Historic Parks and Sites Branch, Parks Canada, and published by the Public Information Branch
Design Management: Eric Plummer

Canadian Historic Sites/Lieux historiques canadiens will be published as papers become available. Manuscripts may be submitted to Chief, Research Division, National Historic Parks and Sites Branch, Parks Canada, Indian and Northern Affairs, Ottawa, Ontario K1A 0H4, Canada.

Articles appearing in this series are abstracted and indexed in *Historical Abstracts* and/or *America: History and Life*.

The Halifax Citadel, 1825–60: A Narrative and Structural History,

by John Joseph Greenough

Canadian Historic Sites
Lieux historiques canadiens
No. 17

National Historic Parks and Sites
Branch
Parks Canada
Indian and Northern Affairs
Ottawa, 1977

Cover: Halifax Citadel at sunrise, 1838; watercolour by A. C. Mercer. *(Public Archives of Canada.)*

© Minister of Supply and Services Canada 1977.
Available by mail from Printing and Publishing,
Supply and Services Canada, Ottawa, K1A 0S9,
or through your bookseller.

Catalogue No.: R61-2/1-17
Library of Congress Catalogue Card No.: 70-103875
QS-7018-000-BB-A1

Price Canada: $6.00
Price other countries: $7.20
Price subject to change without notice.

Thorn Press Limited
Contract No. A0767-A0727-5-5862

The Halifax Citadel, 1825–60: A Narrative and Structural History

by John Joseph Greenough

Canadian Historic Sites
Lieux historiques canadiens
No. 17

6 **Glossary of Fortifications Terms used in this Report**
9 **Abstract**
9 **Sommaire**
10 **Acknowledgements**
10 **Introduction**
11 **". . . we have nothing on Citadel Hill but a heap of ruins . . . ."**
14 **The Bureaucratic Process**
20 **Colonel Nicolls's Citadel**
31 **"I now think I made a little too free with the Climate . . . ."**
40 **Truth and Consequences**
52 **Imbroglios**
61 **Colonel Calder Revises**
73 **". . . the Necessity of Remedying the leakage . . . ."**
91 **". . . and keep your powder dry!"**
105 **The Very Model of a Modern Major General**
116 **Of Mr. McCully's Cow and Other Matters**
127 **Epilogue**
130 **Appendix A: Ordnance Staff and Officers Commanding at Halifax**
131 **Appendix B: The Trace**
133 **Appendix C: Cavalier**
134 **Appendix D: Magazines**
136 **Appendix E: Casemates**
140 **Appendix F: Drainage**
143 **Appendix G: Walls**
147 **Appendix H: The Gate and Bridge**
148 **Appendix I: The Sally Ports**
148 **Appendix J: Ravelins**
150 **Appendix K: Armament**
154 **Appendix L: General Plan**
Bibliography
183 **Endnotes**
194 **Select Bibliography**

Tables

17 1 The Smyth Commission: Comparison between the Costs as estimated by the Commissioners and as estimated by the Engineers at the Stations
30 2 Nicolls's Escarp Profiles compared to Vauban's recommended Dimensions for Escarps of similar Size
51 3 Approximate Amounts by which the various 1833 Estimates exceeded those of 1825
95 4 Proposed Armament, 1846

> Now, *here*, you see, it takes all the running
> you can do, to keep in the same place.
> If you want to get somewhere else, you
> must run at least twice as fast as that!
>
> (*Through the Looking Glass*, Lewis Carroll)

Glossary of Fortifications Terms Used in this Report

Arch: The crown of an arch is the highest or central part; the spring is the point at which the arch connects with the wall.

Banquet(te): A raised path along the inside of a ditch or parapet on which soldiers may stand to fire at the enemy.

Bastion: A projecting part of a fortification, usually pentagonal; one side opens into the main body of the work.

Caponier: A covered structure permitting flanking fire to cover the ditch.

Casemate: A vaulted room, used for a variety of purposes (barrack accommodation, storage, artillery, etc.). Frequently built under ramparts (q.v.).

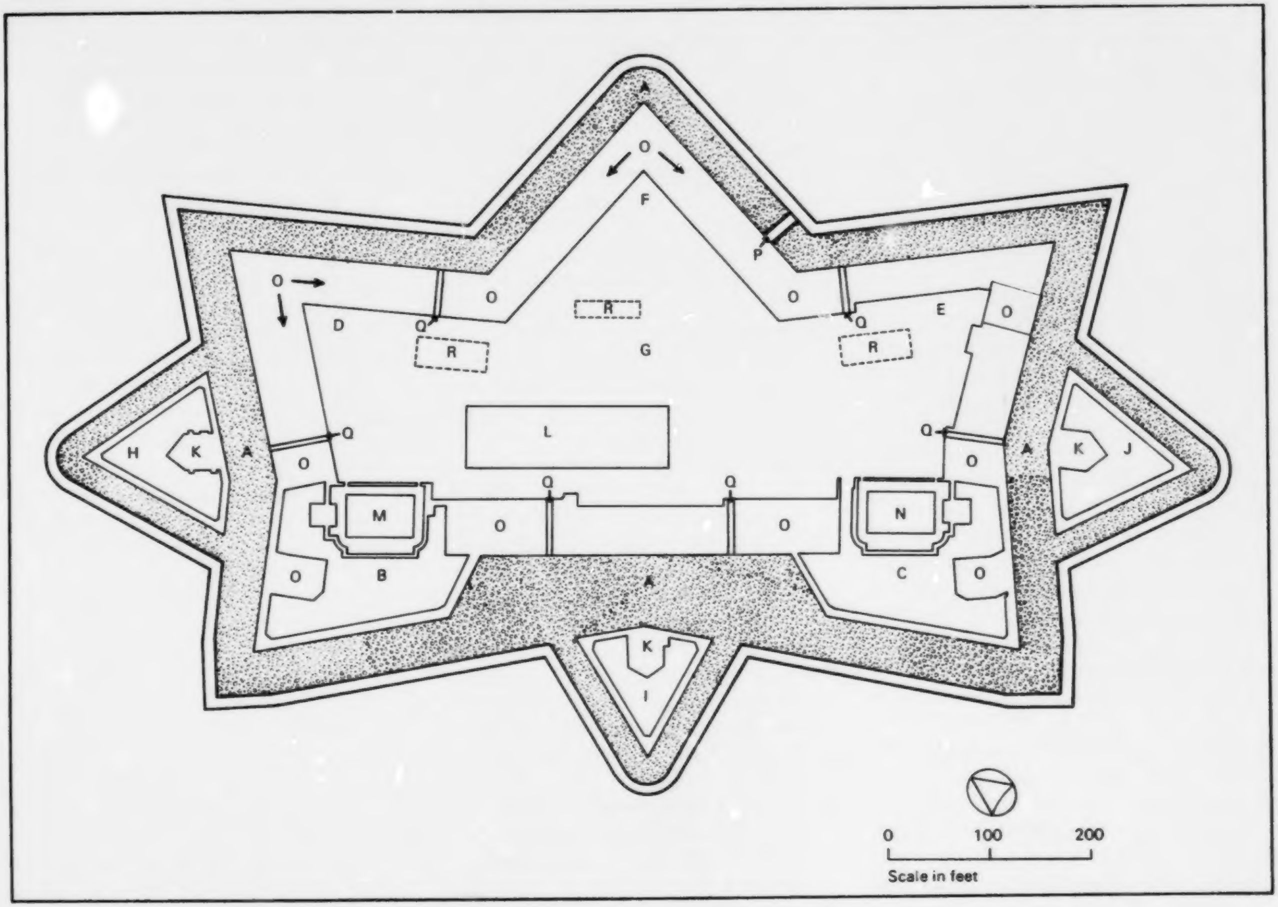
Casemate of defence: A casemate behind the counterscarp embrasured, and mounting guns to cover the ditch.

Casemate of reverse fire: An arched structure behind the counterscarp and opposite a salient (q.v.), provided with embrasures to flank the ditch.

Cavalier: A heavily constructed building, usually higher than the other works, which mounts a battery on its flat roof covering the ground around the fort.

Countermine: A chamber or gallery dug under the glacis (q.v.), containing a charge of gunpowder which may be blown up as an enemy approaches. Also a tunnel dug to obstruct an enemy who is trying to dig under and blow up a wall.

1 The Halifax Citadel: a modern redrawing of the 1847 ground plan. The key is as follows:
A Ditch
B Northwest demi-bastion
C Southwest demi-bastion
D Northeast salient
E Southeast salient
F Redan
G Parade
H North ravelin
I West ravelin
J South ravelin
K Guardhouses
L Cavalier
M North magazine
N South magazine
O Casemates (ramparts)
P Gate and bridge
Q Sally ports
R Tanks
(Drawing by D. Kappler; original in Public Archives of Canada.)


A
O
F
P
O
O
R
O
E
O
D
Q
Q
R
G
R
H
K
A
Q
L
Q
A
K
J
O
O
Q
Q
M
O
O
N
O
B
A
C
O
K
I
0
100
200
Scale in feet

Counterscarp: The outer wall of a ditch, facing the escarp and the fort itself.

Covert way: A road running around the outside of the ditch, protected by its own parapet, used to cover the glacis and to move men and equipment around the fort under the fort's protection.

Curtain: Any wall which connects two bastions.

Demi-bastion: A bastion with two faces and only one side, built in the form of a quadrilateral. One side opens into the fortification.

Dos d'ane: A peaked construction, shaped like a gable roof, built up over an arch in order to shed water.

Embrasure: An opening cut for cannon, either into a wall or the ramparts. Usually cut at an angle to give maximum covering fire.

Epaulment: A mass of earth raised to protect troops from enemy fire.

Escarp (or scarp): The inside wall of a ditch, facing away from the fort.

Flank: Any part of a fort designed to protect another part, usually by being angled in such a way that fire can be directed in a wide arc.

Gallery: (*1*) An underground passage behind the counterscarp, loopholed for musketry, covering the ditch; (*2*) the underground passage to a countermine (q.v.).

Glacis: A long, gentle slope leading up to a fortification from the surrounding country, covered by fire from the fortification.

Gorge: Literally, throat. The inside of a bastion or ravelin, facing the interior of the fort; the area not provided with ramparts. Usually at ground level.

Magazine: A heavily built structure in which gunpowder is stored.

Parapet: A low wall built to protect defenders, either from gunfire or from falling off the top of a rampart, cavalier or other raised work.

Place d'armes (place of arms): A widened area in the covert way, usually close to the body of the work, where mobile artillery may be concentrated.

Rampart: A mound of earth piled up for defending a place, capable of resisting artillery fire. It should be wide enough on top to allow troops and guns to pass. In the case of the Citadel, the rampart is the main wall of the work, just inside the ditch.

Ravelin: A triangular work, built outside the ditch and in front of the curtain, with two faces. Frequently flanks the bastions and ditch.

Redan: A simple work with two faces, triangular and open in back, which faces toward an attacker.

Re-entering angle (re-entrant): Any angle pointing toward the *inside* of the fort.

Retaining wall: Any wall built to enclose and support the face of a body of earth (e.g., a dike, ditch, shoulder or rampart).

Revetment: The retaining wall of a rampart.

Salient angle (salient): Any angle pointing *away* from a fortification, toward the glacis.

Sally port (postern): An opening in the main body of a fortification, other than the main gate, allowing troops to pass toward the enemy. Usually (and necessarily) very well defended.

Shifting room: There is no accepted definition of this term. For the purposes of this report, the shifting room is a casemate in a magazine, probably used for moving powder and possibly for loading shells with powder.

Terreplein: (*1*) A level surface on which guns may be mounted (e.g., the top of a cavalier, covered with earth); (*2*) the surface of a rampart behind the parapet; (*3*) any sloping bank of earth behind a wall.

Trace: The general ground-plan of a fortification.

Abstract

As a result of the need to defend Halifax as the base of the British Navy in the North Atlantic, the British government decided in 1828 to build a permanent fortress in Halifax. Originally the work was to take six years and to cost £116,000. Because of a number of problems – inadequate design and climate being the worst – the work was not finished until 1857–60 and cost £242,122. This report discusses the history of the building, the background in which it took place, and the structure of the fortress and its individual components.

Submitted for publication, 1974, by John Joseph Greenough

Sommaire

Entre 1749 et 1825 furent présentés maints projets de forteresse permanente sur la colline de la Citadelle à Halifax, et trois ouvrages temporaires effectivement érigés mais vite tombés en ruine.

En 1825, une commission d'ingénieurs militaires, dirigée par Sir James Carmichael Smyth, étudia les ouvrages défensifs de l'Amérique du Nord britannique, puis formula nombre de recommandations détaillées dont celle d'un ouvrage permanent sur la colline de la Citadelle. Après de longues délibérations, le gouvernement britannique finit par accepter quelques-unes des recommandations de la commission Smyth, dont le projet de la colline de la Citadelle. Approuvé à l'été 1828, le projet fut presque aussitôt mis en chantier.

Le projet initial prévoyait six ans de travaux au coût de £116,000. Mais les plans primitifs n'allaient pas et la proposition de réviser la façade est de l'ouvrage bouleversa gravement le calendrier d'exécution. Dès 1834, les travaux avaient pratiquement cessé et une longue lutte s'engagea entre le Génie et l'Intendance. Ce n'est qu'en 1838 que les plans définitifs de l'ouvrage furent enfin approuvés. On les modifia par la suite pour accroître l'efficacité de la forteresse qui, enfin, en 1846 semblait presque achevée.

Le plan original subit deux principales modifications: la construction d'un redan sur la façade est de l'ouvrage et l'affectation de casemates au logement. Vers 1848, on se rendit à la pénible évidence du manque d'étanchéité de ces dernières, et il fallut huit ans pour y remédier; d'autres éléments de la Citadelle, notamment le cavalier et certaines escarpes, menaçaient alors de s'effondrer. Pendant les dernières années de construction, on tenta presque désespérément de corriger les défauts de la forteresse. Certaines parties, le glacis par exemple, demeurèrent inachevées.

Même avant terme, les progrès de l'art militaire avaient dépassé la Citadelle. Les premiers canons rayés reçurent le baptême de feu au cours d'un siège pendant la guerre de Crimée. Pendant la décennie suivante, l'apparition de navires de guerre cuirassés, de gros canons lisses et de pièces d'artillerie à chargement par la bouche et la culasse modifièrent radicalement toute la stratégie des fortifications permanentes. En 1870, les batteries du port étaient devenues, selon toute apparence, les ouvrages défensifs les plus importants d'Halifax, et même si la Citadelle fut, à un moment, partiellement réarmée pour défendre le port, elle n'importait guère plus à la protection de la ville. A la fin des années 1870, elle se trouvait complètement désuète.

Acknowledgements

The author wishes to acknowledge the assistance given him in his research by the staffs of the Public Archives of Canada and the Public Archives of Nova Scotia, and thanks those institutions, as well as the Metropolitan Toronto Public Library and the Public Record Office, London, for permission to reproduce various maps, plans, photographs and pictures as illustrations in this report.

The author also thanks Carol Whitfield and George Ingram of the Research Division, National Historic Parks and Sites Branch, Parks Canada for reading parts of the manuscript and offering valuable suggestions. Finally, the author wishes to thank his copy editor, Molly Wolf, and the publication staff of National Historic Parks and Sites Branch, without whose dogged hard work this report would never have reached its final form.

Introduction

The first plans and estimates for the present (fourth) Halifax Citadel were submitted to the Inspector General of Fortifications on 20 December 1825. Three years later, the British government granted funds for the project, and work on it began in August 1828. It was intended to complete the Citadel within six years at a cost of £116,000; the construction continued for 28 years and finally absorbed £242,122.

This report is an attempt to describe the construction of the fortress from its inception to its completion in 1857–60. The report is based almost entirely on primary documentation, chiefly the papers of the Corps of Royal Engineers and the Board of Ordnance in the Public Archives of Canada and the Public Archives of Nova Scotia. The nature of the material is reflected in the character of the paper; it is chiefly concerned with an examination of the workings of the bureaucracy of the Ordnance and Engineer establishments as reflected in the Citadel's construction. It also examines the military and political background of the decision to build the fortress, and the changes in military technology which rendered the work obsolete even as it was being completed.

A number of appendices are included in the report. Appendix A is a list of officers in the Engineer establishment, both in Halifax and London. Appendices B through K discuss various components of the fortress. Since there are many references in the endnotes to plans of the Citadel in the collection of the National Historic Parks and Sites Branch, it was felt advisable to include here as Appendix L the general plan bibliography. Appendices B through L are drawn from the second part of the report appearing in the Manuscript Report Series No. 154 produced by the Branch in 1975.

". . . we have nothing on Citadel Hill but a heap of ruins . . . ."

I

The hill is a drumlin – that is, a glacial rubbish heap. Contrary to popular belief, the one element absent in the composition of its summit is solid bedrock. It is an inconvenient place to build anything and, without the proprietary interest of the military, the early settlers of Halifax would probably have ignored it – indeed, they would most likely have put the town itself in a more convenient location. The army, however, was quite incapable of leaving the hill alone. One supposes that Cornwallis or his engineer, John Brewse, took one look at the tree-covered hump dominating everything in sight and, ignorant of its true composition or even its exact shape, decided that it was the ideal site for a fort to protect the new town. It was a decision which would bedevil engineers for the next seventy-odd years.

As the land was cleared around the new town-site, the truth became apparent. From the harbour the hill was indeed imposing; from the landward side, it was less so. Viewed from the swamp behind it, it was only an egg-shaped hillock, rising 60 or 70 feet from the bottom of the swamp, with a crest just big enough for a small redoubt. Less than 700 yards away to the southwest was a second hill, more substantial but lower. From a military point of view, the second hill (Camp Hill) and the swamp (now the central common) proved to be more important than Citadel Hill's imposing view of the harbour, for their very existence severely limited any possible alterations to the chosen site. While the soil of the drumlin permitted it to be hacked down to a more convenient shape, this could only be done to a limited extent. Only massive cutting could alter the fundamental shape of the crest, which was inconveniently narrow for regular fortifications, and this was inadvisable; any great reduction in the overall height would make it impossible for the hill to dominate the swamp, let alone Camp Hill.

Colonel James Arnold, writing in 1824, summed up the frustrations and difficulties of military planning for the site.

[As a result] *of the extreme narrowness of the ridge . . . but little more space can be obtained without losing the Command from which it now* [?] *derives its chief importance. A front of 400 feet on the North and South sides, is the full extent that I think can be procurred . . . and that it is much too short for any good flank defence* from itself, *but that of the redan system to which . . . in this instance, I see two objections; – first, that by extending as far as I could wish, the salient angles would be much too acute, – and, secondly, that sufficient space would not, by that plan, be afforded to the troops . . . .*

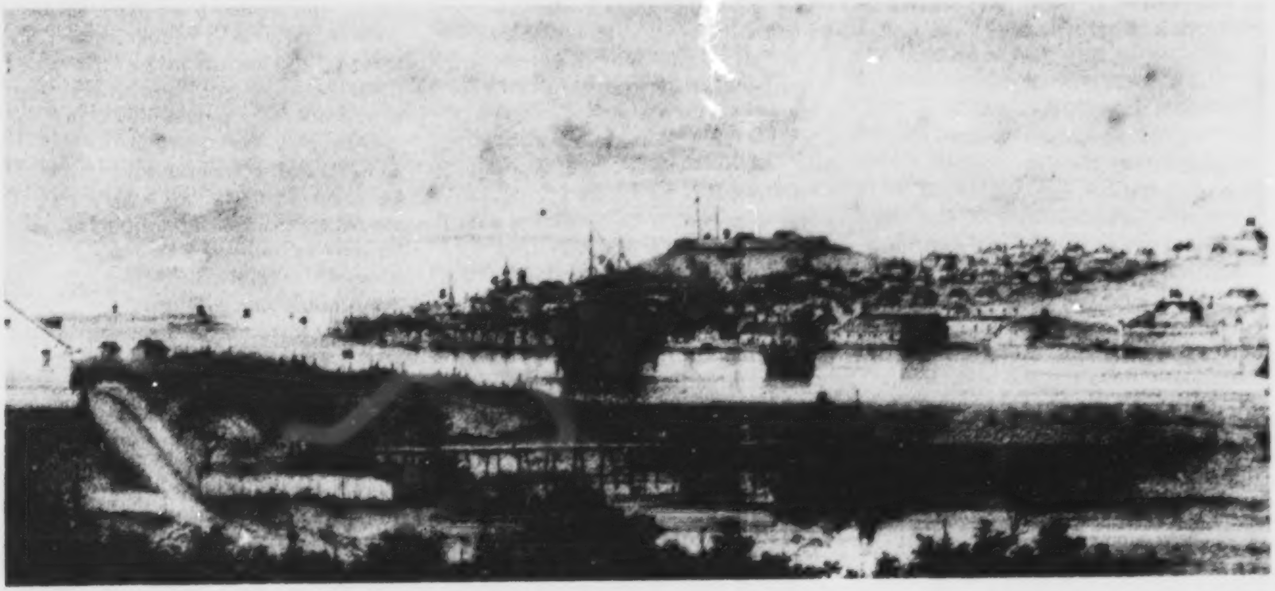
On the East and West fronts, a side of 800 feet may be procurred, which, though short, is still sufficient to afford a very respectable front, with three, or perhaps, four guns in each flank. Indeed, considering the narrowness of the ridge, a longer front on those sides would not be convenient, for the present perpendiculars are only 1/12; and the space between the Curtains is little enough, whereas, if the fronts were much longer, either little or no flank defence could be obtained in that way, or the Curtains would actually meet . . . .

I am aware that any work placed on it must be defective . . . . Every Officer who has been here seems almost to have given the case up, in despair.[1]

Between 1795 and 1824, three proposals were made to solve the difficulty. The central problem in each design was the fortification of the narrow northern and southern fronts and each attempt proposed a different solution. Elements of two of these schemes eventually found their way into the existing Citadel.

The first and most simple design was that of Captain James Straton, and it was the only one of the three actually to be built (the third citadel, 1795–96). Straton's design was a simple adaptation of the regular bastion system and consisted of four more or less regular bastions connected by curtains and enclosing a log and earth cavalier which served both as gun platform and barracks.[2] This had the advantage of regular form and compactness, but was clearly inadequate on the northern and southern

2 "Halifax from the Red Mill, Dartmouth," lithogragh by William Eagar (ca. 1839). The height of the hill (No. 9) is slightly exaggerated in this view, but it does give a good idea of the imposing nature of the site as viewed from the harbour. Most of Halifax is shown as well as McNab Island (No. 1). Georges Island (No. 2) and the naval dockyard (at the extreme right of the picture). (*Toronto Public Library*.)



fronts. These fronts were so short (400 feet) that the regular bastion form, suitably reduced, looked ludicrous; the flanks and curtains were little more than vestigial. It was obvious that a more elaborate arrangement was necessary.

The next engineer to tackle the problem was Colonel William Fenwick who, in 1800, submitted a design for a permanent work to replace Straton's.[3] Fenwick attempted to take advantage of the most obvious feature of the site, its smallness. He retained Straton's trace more or less intact, but relegated it to second place as a sort of outwork to his grand central keep, which occupied most of the crest of the hill. The keep consisted of two large stone towers connected by a masonry cavalier, the whole being more than 400 feet long and a minimum of 50 feet wide. The towers were to be placed at the northern and southern ends, and were to be surrounded at the base by a series of masonry caponiers which were intended to make the towers self-defensible. What Fenwick had in fact designed was a sort of gigantic Martello tower. (The first three of Halifax's five towers had been designed by Straton between 1796 and 1798.) The scheme was relatively simple, if expensive; because the towers avoided the whole problem of the short fronts, it was another 25 years before the military finally abandoned Fenwick's idea.

In 1824, Colonel Arnold became the third engineer to attempt a solution. He paid lip service to the virtues of Fenwick's towers (largely, one suspects, because General Gother Mann, the Inspector General of Fortifications, liked them), but decided that something more elaborate was essential to protect the short fronts. He proposed that the works be extended on these fronts, and that the extra space be used to provide adequate flank protection. He also was the first engineer to provide for casemates under the ramparts.[4] Arnold's was the most elaborate of the three schemes, and the only one which provided for permament construction of the whole work in masonry. It also presented an elaborate compromise between Straton's regular system and Fenwick's keep. In spirit, if not in form, Arnold's plan was the closest of the three proposals to Colonel Nicolls's design for the present work, a design which was made less than a year later.

II

Arnold's predecessors had been bedevilled by other problems than the shape of the hill. What drove most of them to distraction was not so much the site itself as the ruins of several generations of improvised fortification which occupied it. These were the results of hasty building in emergencies followed by years of neglect, largely resulting from the long-standing disinclination of the British government to spend money on colonial fortifications. The ruins were enough to irritate any self-respecting engineer.

The early citadels were poor things at best.[5] The first, a simple log fort designed solely to keep out Indians, had lasted less than a decade. The second was an octagonal blockhouse surrounded by field fortifications which wound over the crest and down the slopes in all directions, and had an equally brief and undistinguished career – although the blockhouse was obviously one of the ancestors of Fenwick's elaborate keep. Even Straton's third citadel, an enormous improvement on its predecessors, suffered from the same impermanence. Like them it was constructed of sods and logs; like them, it began to fall down almost as soon as it was built. Like them also, it had been allowed to go to ruin until a military crisis – the outbreak of the War of 1812 – prompted yet another round of emergency repairs. The walls were re-sodded, the logs replaced and a new magazine was built. The magazine was the first major innovation on the site; it was built of masonry and, not surprisingly, outlasted the works surrounding it. By 1820 it was the second most visible landmark in the city and a rather embarrassing monument to the virtues of permanent construction.

Sir James Carmichael Smyth, one of the men responsible for the present citadel, put the argument for permanent construction succinctly. He wrote in 1827,

> [Recently] *I had an opportunity of seeing for the first time a report upon the province of Nova Scotia drawn up . . . in the year 1783 by the late General Morse . . . . It is curious, but it is melancholy with a view to the public purse and the public service to observe that with the exception of those changes which time and an increase of population have brought about, our late reports and memoirs* [the Smyth report] *as far as regards Nova Scotia, are in a great measure but an echo of General Morse's . . . . He* [observes] *. . . that more has been expended than would have been required to build a respectable Fortress and which in page 66 he strongly recommends should be constructed on Citadel Hill . . . . If in the year 1783, the General's observations were just and his statement with respect to the unprofitable expenditure of the public money upon temporary measures was correct, how much more would his remarks apply in the present day when so much additional money has been spent and we have nothing on Citadel Hill but a heap of ruins.*[6]

The Bureaucratic Process

I

The process by which the "heap of ruins" on Citadel Hill was transformed into a permanent fortress began, oddly enough, with the abandonment of the naval force on the Great Lakes. It had become obvious in the course of the War of 1812 that naval control of the lakes was necessary to preserve the British position in the Canadas. It was taken for granted at the end of the war that contingency planning would, in future, hinge on the naval question; the army would confine its activities to the retention of key points like Quebec and Kingston.[1] This policy was abandoned almost before it was properly implemented for a number of reasons, all of them having to do with British imperial policy in the post-Napoleonic period and few of them directly concerned with British North America.

The most important consideration was financial. Between 1792 and 1815 the direct cost of the British military establishment had soared from £4.5 million to £58 million.[2] The latter figure horrified politicians of every ideological stripe, and Napoleon was barely on his way to St. Helena when the drastic cuts in expenditure began. By 1819 the total spending on the military had fallen to about £16 million, and it remained at or below this figure for decades.[3] In this atmosphere of relentless cheese-paring, there was no place for a naval arms race on Lake Ontario. Even the cost of maintaining a skeleton establishment – £24,000 in 1816[4] – was considered excessive. A more economical method of defence had to be found.

There were other considerations. Expenditure on colonies had always been unpopular, and in the post-war period an increasingly large number of politicians objected to it on both fiscal and ideological grounds. Anti-colonial sentiment became widespread, and no government could afford to ignore it. Post-war diplomacy complicated the picture still further. The maintenance of a naval force on the Great Lakes acted as an irritant in an era when the British government wanted to improve relations with the United States. In the end, it was neither the Treasury nor the Colonial Office which settled the issue; it was the Foreign Office. By concluding a treaty with the Americans in 1817 which demilitarized the lakes (the Rush-Bagot agreement), the diplomats rendered the post-war military's plans ineffective. Although the naval establishments were not finally abandoned for over a decade, it was obvious that a new policy was necessary.

Not surprisingly, the impetus for such a new policy came from the colony. London was quite content to ignore the whole business, and but for a wholly fortuitous circumstance the old pre-war pattern of piecemeal work undertaken reluctantly in response to pressure from one or another of the colonial authorities would have been repeated. The circumstance in question was the installation of the Duke of Wellington as Master General of His Majesty's Ordnance in 1819. Since the Ordnance was responsible for all fortification, it was the department toward which all colonial schemes tended to converge. Most Masters General had tended to ignore the whole odious business – what was the point of having an Inspector General of Fortifications if not to handle such matters? In this, as in much else, Wellington was exceptional. He was capable of reducing a very complicated problem to a single brilliant memorandum. More importantly, he was the only soldier with sufficient prestige to force the government to take notice of his proposals. He was a very busy man, but somehow, along with the Spanish question, the diplomatic intricacies of the European conference system, the various ills of the royal family and the many other unrelated problems awaiting his attention, he managed to find time for the problem of Canadian defence.

The immediate occasion for Wellington's intervention was the arrival of a long dispatch from the Duke of Richmond, the governor in chief of the Canadas. A vacuum had been created by the collapse of naval strategy and the army had been quick to fill it. Richmond, filtering the reports of his military advisers, had drawn up a comprehensive report on the subject of Canadian defence and had sent it off to London in August 1818. The report, which was concerned exclusively with Upper and Lower Canada, proposed strengthening the works at Quebec, Ile-aux-Noix, Kingston and Montreal, developing canal navigation, defending the Niagara frontier, and improving the militia.[5] The trouble was that no one took Richmond too seriously. He had impeccable social credentials (he was descended from one of Charles II's illegitimate children), but he was regarded as something of a lightweight – a reputation which was, if anything, reinforced when he had the bad taste to die mysteriously (apparently of rabies) in the Upper Canadian wilderness the following summer. His military reputation was probably worse than his administrative one. Half the army either remembered or had heard about his escapades at Waterloo where, as an interested former officer, he had had the uncanny ability of appearing at the least opportune moment. His report would probably have been forgotten had it not been passed on to Wellington who, having considered it, produced another of his concise and brilliant memoranda.

"I am about to communicate to Your Lordship," Wellington wrote to Bathurst on 1 March 1819, "my opinion upon the plans of defence for these provinces." The memorandum which followed dealt, in eight pages, with everything from the overall strategic concepts involved to the escarp revetment of the fort at Ile-aux-Noix. Wellington abandoned the theory of naval superiority: "It can scarcely be believed that we shall be able to acquire and maintain that naval superiority." He substituted a system of strong points and protected supply routes, and detailed the manner in which the system could be operated in time of war and the quantities of men necessary to do it. It was an entirely defensive strategy, and the two key components were communications and fortification.[6]

Wellington's analysis was accepted, and for several decades, the 1819 memorandum was the bible of Canadian defence. For the moment, however, there was no attempt made to implement his recommendations systematically. Money was granted for those projects which seemed most urgent – Quebec, the canals and the fort at Ile-aux-Noix. The latter (christened Fort Lennox, Richmond's family name) was something of an ominous sign for the future. Richmond had estimated that the work would cost £10,000. By 1825 it had absorbed £57,000 and was still incomplete.[7]

In 1825 a crisis in Anglo-American relations caused by the question of the former Spanish colonies in Latin America brought the problem of North American defence to the attention of His Majesty's government once again.[8] The government became uncomfortably aware that its entire policy, insofar as it had one, was based on an eight-page memorandum by a man who had never personally been to North America. Wellington himself had the solution: a commission of engineer officers empowered to make a survey of the whole question on the basis of extensive travel in the colonies. Similar commissions had investigated conditions in other colonies since Wellington had taken over the Ordnance department, so there was a precedent. In the case of British North America the idea was particularly appropriate, since there was in fact no local authority (despite the theoretical jurisdiction of the governor in chief) capable of producing a comprehensive survey of all the colonies. In this way the Atlantic seaboard was, for the first time, linked with the Canadas in the strategic reasoning of the British government.

The duke's instructions to his commissioners echoed the considerations outlined in his 1819 memorandum, and added the problems of overland communication from Quebec to New Brunswick and the defence of Saint John, New Brunswick, Halifax and the Atlantic coast as subjects for investigation. In each instance Wellington had provided specific suggestions for the guidance of the officers. In Halifax, for instance, the commissioners were instructed to examine both the harbour defences and "the ground on which Fort George [the Citadel] . . . now stands."[9]

Wellington chose Sir James Carmichael Smyth as president of the commission. Four years earlier, in recommending Smyth for baronetcy, the duke had described him as "a highly respectable officer [who] has many foreign orders," adding that he had "a very large fortune."[10] Smyth had been chief engineer at Waterloo,[11] had already headed a similar commission in the West Indies,[12] and was shortly to be made a major general at the relatively young age of 46. In short, he was the quintessence of a rising engineer.

Smyth and his two fellow commissioners, Lieutenant Colonel Sir George Hoste and Captain John Harris, toured the colonies in the summer of 1825. The colonial engineer establishment had never seen anything quite like it – a wealthy baronet, backed by the government and bearing personal instructions from the Duke of Wellington. The progress of the commission through the colonies in the summer of 1825 was rather like that of Lord Durham 13 years later. Indeed a comparison between the two is not altogether inapt: both embodied attempts by the British government to bring order to a confusing situation; both represented an expedient which had not been tried before in Canada, and both were to lay the foundations for future policy for years to come.

The commissioners ended their journey at Halifax in September, and there they wrote their report. The report was, for all intents, Wellington's instructions expanded to book length, with specific details on local conditions and estimates of the amount of money needed to implement each item. The only major difference lay in the commissioners' advocacy of limited offensive operations against the United States if war were to break out (paragraph 52).[13] For the rest, the commission recommended major fortresses at Montreal, Kingston, Niagara and Halifax, canalization of the Ottawa and Rideau rivers, and a dozen or so lesser works of various sizes from Amherstburg to Annapolis Royal. The total cost of all proposals was estimated at £1,646,218.

II

The Smyth report now passed into the realm of British politics. Colonial defence was unpopular, and the commission's recommendations seemed likely to provoke an explosion if they came under formal debate in Parliament. The vicissitudes of the report at the hands of successive governments during the following three years reflected both the essential unwillingness of even a Tory administration to risk much over it, and the relative position of Wellington in the changing ministries.

It was a period in which the old Tory party, which had governed England more or less continuously since before the turn of the century, was in the process of slow disintegration. Lord Liverpool had been in power since 1812. His administration was becoming increasingly divided into moderate (Canningite) and extreme (Ultra) factions, and as a result was more and more inclined to avoid provocative action whenever possible. It was this ministry which received the commission's recommendations in December 1825. Accompanying them was a letter from Wellington to Lord Bathurst, advocating that the recommendations be acted upon quickly. "I earnestly entreat, then, Your Lordship's attention and that of his Majesty's Government to the enclosed document; and that I may be authorized to have these measures proposed to Parliament in the next session."[14]

Two months later, Wellington elaborated on the manner in which he proposed to present the recommendation. Noting that it would "be impossible to go before Parliament on this subject without laying before the House, the whole of our scheme," he suggested that the report be communicated to "a secret committee of the House." By this means he hoped to secure approval for the whole scheme. For 1826 he proposed to ask for £100,000, £20,000 of which was to be allocated for Halifax.[15]

The cabinet had no intention of doing any such thing. Someone had carefully read the Smyth report, and noted that in each recommendation Smyth had instructed the commanding engineer at each station to present a detailed estimate. Would it not be wise to wait for such estimates to arrive? After consultations involving the Clerk of the Ordnance, the Chancellor of the Exchequer and Lord Liverpool himself, it was decided to ask for only £25,000 in 1826, all of which was to be spent on the Rideau and Ottawa canals.[16]

Wellington, writing to Smyth in August 1826, was still optimistic,[17] but even as he wrote, the detailed estimates were being received by the Inspector General of Fortifications. The estimates were, to say the least, alarming, most of them exceeding Smyth's own predictions, some of them by phenomenal amounts (*see* Table 1). The grand total now stood at £2,335,554,[18] and there was no guarantee that the new figure would be definitive. Perhaps some people at the Ordnance and the Treasury remembered that Fort Lennox had gradually exceeded the original estimate sixfold. It was hardly surprising that the projects fared little better in 1827 than they had in 1826; the government asked for only £56,000 for canals and £5,000 for preparing materials at Kingston.[19]

Even this limited grant caused trouble. In the debate over the Ordnance estimates, one honourable member

> *alluded to a rumor which he had heard of certain works that were going on in intention to erect a line of forts on the River St. Lawrence. He wished to know whether these projects were to be carried out without any information being given to the House on the subject.*[20]

Table 1. The Smyth Commission: Comparison between the Costs as estimated by the Commissioners and as estimated by the Engineers at the Stations*

Work	Commission's estimate	Engineer estimate
1 Grenville Canal	£ 20,000	£ –
2 Other Ottawa canals	50,000	–
3 Rideau Canal	169,000	474,844
4 St. John's, Lower Canada	50,000	48,187
5 Chambly	50,000	198,289
6 Châteauguay	55,000	43,033
7 Montreal citadel	250,000	315,122
8 St. Helen's Island (Ile Ste-Hélène)	42,500	52,311
9 Fort Henry	201,718	214,649
10 York	50,000	132,312
11 Niagara fortress	250,000	288,746
12 Mouth of the Ouse	50,000	83,000
13 Chatham	50,000	117,593
14 Amherstburg	62,000	67,966
15 Penetanguishene	30,000	56,632
16 Halifax, Citadel, etc.	160,000	115,998
17 Needham Hill	6,000	8,865
18 Fort Clarence	40,000	32,528
19 Annapolis Royal	30,000	39,209
20 Windsor	30,000	31,389
21 Saint John, N.B.	–	14,019
Total	£1,646,218	£2,335,544

*PAC, RG8, Series II, Vol. 6, part 1, Smyth report; and Ellicombe memorandum of 1 March 1828 in Arthur Wellesley, Duke of Wellington, *Despatches, Correspondence, and Memoranda of Field Marshal Arthur, Duke of Wellington ...* (London: J. Murray, 1867–80), Vol. 3, pp. 81–3.

Sir Henry Hardinge replied for the government. Sir Henry was Clerk of the Ordnance and certainly knew about the Smyth report. Nonetheless he flatly denied the allegation – a fact which indicates how little inclined the government was to bring the report before Parliament. Sir Henry did, however, admit that

> *there were undoubtedly parts of that territory which required additional defence. With respect to Halifax, for instance, it was recommended that quarters be provided for a body of troops and a proper building provided for the reception of stores. These measures appeared to be necessary; because if an enemy turned the sea batteries, as the place was at present situated, the town must fall into his power.*[21]

Quarters for a body of troops, and a proper building for the reception of stores; in this (rather unsuitable) disguise the Halifax Citadel project arrived before the British Parliament.

Two months later, the chances of the project receiving a more forthright explanation before the Commons receded still further. In April, Liverpool became incapacitated and the ministry fell apart. Canning, the representative of the left wing of the Tory party, became prime minister and the Ultra wing slunk off into opposition. Although Wellington claimed not to be an Ultra – he fancied himself above party[22] – his reaction made even the most diehard Tory blush; he resigned from the supposedly non-political office of commander in chief (which he had acquired when the Duke of York died the preceding January) and pronounced himself disgusted with the whole business. A moderate Tory government holding office with Whig support was, to say the least, highly unlikely to consider spending money on Canadian forts, and with the most prestigious political supporter of the project sulking at Apsley House, even the Ultra Tories were inclined to forget about it.

Canning was ill even before he became prime minister, ironically as the result of a chill contracted at the Duke of York's funeral. In August 1827 he died, plunging the Tory party and the English government into an even deeper crisis. The king cast around for a middle-of-the-road prime minister and decided upon Viscount Goderich. It was not a happy choice. "Goody" Goderich, "as firm as a bull rush"[23] was unable to keep his fractious ministers under control. He is remembered, if at all, as the only British prime minister who never faced Parliament.

The king's second choice was only slightly better. Wellington tried to form a middle-of-the-road government, but was only temporarily successful. Whatever else the duke may have been, he was not a politician. Indeed, he confessed when he was still a cabinet minister that he imperfectly understood the workings of the House of Commons.[24] In short order he managed to drive the Canningites out of his cabinet in May 1827, and then, by epousing Catholic emancipation, alienated the Ultras as well in 1829. It was inevitable, under a Wellingtonian ministry, that the Canadian defence scheme would get a hearing. During the early stages of the disintegration of the duke's ministry, the Smyth commission's proposals arrived before the Commons.

The occasion was an investigation by a Select Committee on Public Expenditure into the workings of the Ordnance department. To make the sums of money involved seem less formidable, the proposals of the Smyth commission had been grouped into three classes. The first, headed "first and most urgent," included the Halifax Citadel, Kingston and several other works. The total cost of works in this class was estimated at £798,215, although the fine print conceded that the total grant would, "taken in round numbers," amount to £900,000. The cost of the other two classes ("indefinitely postponed" and "entirely postponed") amounted to £533,581 and £528,963 respectively. The grand total for all the works proposed, excluding the Rideau Canal, was £1,860,760.[25]

It was too much. Even the division of the works into separate classes and the use of such tags as "indefinitely" and "entirely postponed" could not disguise the fact that acceptance of the recommendations could entail the expenditure of anywhere up to £2.5 million in North America, and this at a time when the total budget of the Ordnance department in any given year was only about £1.5 million.[26] But a compromise was reached. Of all the proposed works, only the Ottawa-Rideau canals, the fortifications at Kingston and the Halifax Citadel were salvaged.

A few years later, Lord John Russell recollected that, during Wellington's administration,

> *2,000,000* [pounds] *were demanded to be expended in the fortification of Canada. Those with whom he then acted successfully opposed voting away so large a sum. A new committee was appointed and it was intimated that, if those who opposed the former proposal would consent to the works then going on, the 2,000,000* [pounds] *would not be pressed.*[27]

If Lord John's memory can be trusted, the ministry had not been entirely candid. Although work on the canals was indeed in progress, the only work at Kingston had been the result of the 1827 grant of £5,000 for the preparation of materials, and nothing whatsoever had been done at Halifax. There are grounds for believing, therefore, that the Halifax Citadel, which first arrived in the Commons as a small untruth, may have passed through the House as the result of a much larger one.

III

Once a compromise had been reached, the passage of the remains of the government's Canadian defence policy through the Commons was assured. The debate was, nevertheless, a noisy one, with every shade of political opinion in full voice. On 3 July 1828, a supplementary estimate for £330,664 for new works at Kingston and Halifax was placed before the Commons,[28] and on 7 July Sir Henry Hardinge, the Secretary at War, moved a series of 22 resolutions for the Ordnance supply, the twenty-first of which read:

> *Resolved, that it is the opinion of this Committee that a sum not exceeding 30,000 l be granted to His Majesty towards defraying the expenses of military works at Kingston . . . and Halifax . . . upon a estimate* [sic] *not exceeding, for both these projected works, the sum of 330,664 l.*[29]

When the resolution was read, an amendment was proposed:

> *leaving out the first "that" to the end of the resolution, in order to add the words, "it is imprudent in the present financial condition of this country, to engage in military wars in British North America."*[30]

In the debate which ensued, it was soon evident that the purely military and financial arguments were the least important, although they did occasionally provide some unintentional humour. For example, one Mr. Fitzgerald (a Tory) argued that "Halifax was one of the finest harbours in the world, and as long as we held it and had a canal to carry stores into the interior, the Americans would never again venture to attack us on Lake Ontario."[31] One suspects that the majority of the members present were equally ignorant of Canadian geography, and their ignorance made them indifferent to the whole business. They knew only how they were expected to vote.

Most of the speakers in the debate were chiefly interested in the implication of colonial fortifications on the relationship between colony and mother country, and beyond this, in the whole future of colonies. One of the radical speakers, for example, combined a skeptical view of the future with the traditional radical objection to colonies:

> *There was no certainty he said of our being able to hold Canada. When these works are finished, the colonists might take it into their heads to say "we are not satisfied with your government; we wish to be ourselves . . . ." But, he would ask, of what benefit was Canada to us in a commercial point of view. He would say that, instead of a benefit, it was a disadvantage.*[32]

But this was a relatively superficial speech. The more thoughtful speakers were aware of the political discontent among the colonists, and were concerned that the government was spending a good deal of money on a policy which was, at best, peripheral to the central issues.

Henry Labouchere, a moderate radical, provided a good example of this line of reasoning. He pledged support for the resolution "with this condition – that efforts should be made . . . to give Canada a wise, an efficient and conciliatory government."[33] In this he found himself in virtual agreement with Mr. Huskisson, a Canningite, who went one step further and looked forward to the day when there should be an amicable separation between colony and mother country.[34]

The most articulate statement of this view of the colonial relationship was made by Lord Howick. Howick's statement was particularly appropriate, since it would fall to Howick, later in his career and as the third Earl Grey, to implement the Durham report. Howick suggested that Britain "might in time prepare for separation, not by fortifying the Canadas but by preparing them to be independent."[35]

The task of summing up for the ministry fell to Robert Peel, the Home Secretary and government leader in the Commons. He presented the proposed fortifications as the most economical means of holding the colonies. He skirted the issue of good colonial government, suggested that the loss of the colonies would have an adverse effect on the empire, and concluded by speculating that, even in the event of separation, "it was by no means certain that this money to improve them with adequate means of defence would be ill expended."[36]

The amendment was defeated by a majority of 75.[37] Shortly thereafter, with the final passage of the Ordnance estimates, the surviving items of the Smyth commission's recommendations were approved by Parliament.

IV

The events of the spring and summer of 1828 marked the first and last occasion when an attempt was made to get Wellington's Canadian defence scheme through Parliament. Thereafter, the only debate was about the mounting expenditure on those items which had been allowed, and this, in time, grew acrimonious. But by then Wellington was in opposition, and the sight of his Whig successors reluctantly defending the remnants of his policy must have been one of the few pleasures he ever derived from the whole business.

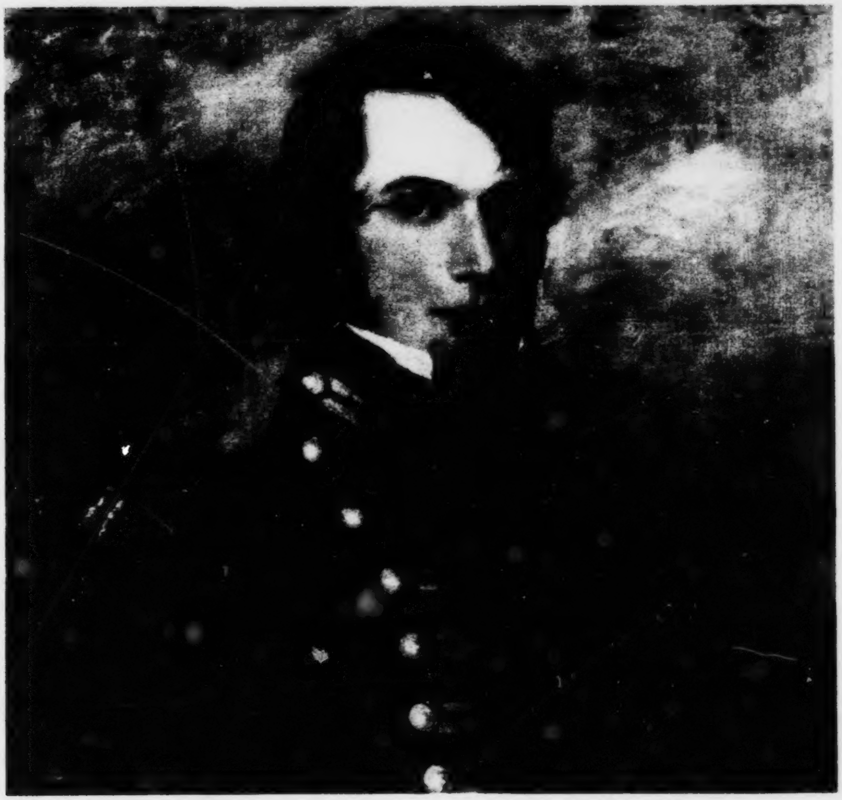
In time, as other crises prompted new examinations of the problems of Canadian defence, younger ministers were afraid to approach the old duke. He was rumoured to be bitter about the subject." He always harks back," Lord Derby explained, "to a plan laid down by himself in 1826, the expense of which was so enormous that all governments have deferred acting upon it."[38]

Colonel Nicolls's Citadel

Although the genesis of the design for the present Citadel seems straightforward enough at first glance, the circumstances surrounding it are, in fact, rather obscure. A careful reading of the relevant documents reveals an essential uncertainty of purpose in the writings of the principals responsible for the design. Had the work been successfully completed without any major mishaps, the ambiguity surrounding its birth would be of no more than passing interest. As it happened, the adoption of the initial plan for the Citadel led directly to a decade of failure and confusion, and the origin of the trouble lay in the uncertainties evidenced in its inception and in the characters of the two men most directly responsible for it.

The first of these two was Sir James Carmichael Smyth. He and his fellow commissioners had the sometimes unenviable task of producing a coherent and reasonable general scheme in keeping with the framework laid down in the Duke of Wellington's 1819 memorandum and in his instructions to the commission. The major problem was that Wellington's instructions, though brief, were far too detailed. The duke was attempting to settle the defence of a country which he had never seen. Although his grasp of the overall strategic problems involved in the defence of British North America was sound enough, he faltered – sometimes badly – in his assessment of the value of specific locations. In fairness to Wellington, one ought to point out that he invariably phrased his suggestions in such a

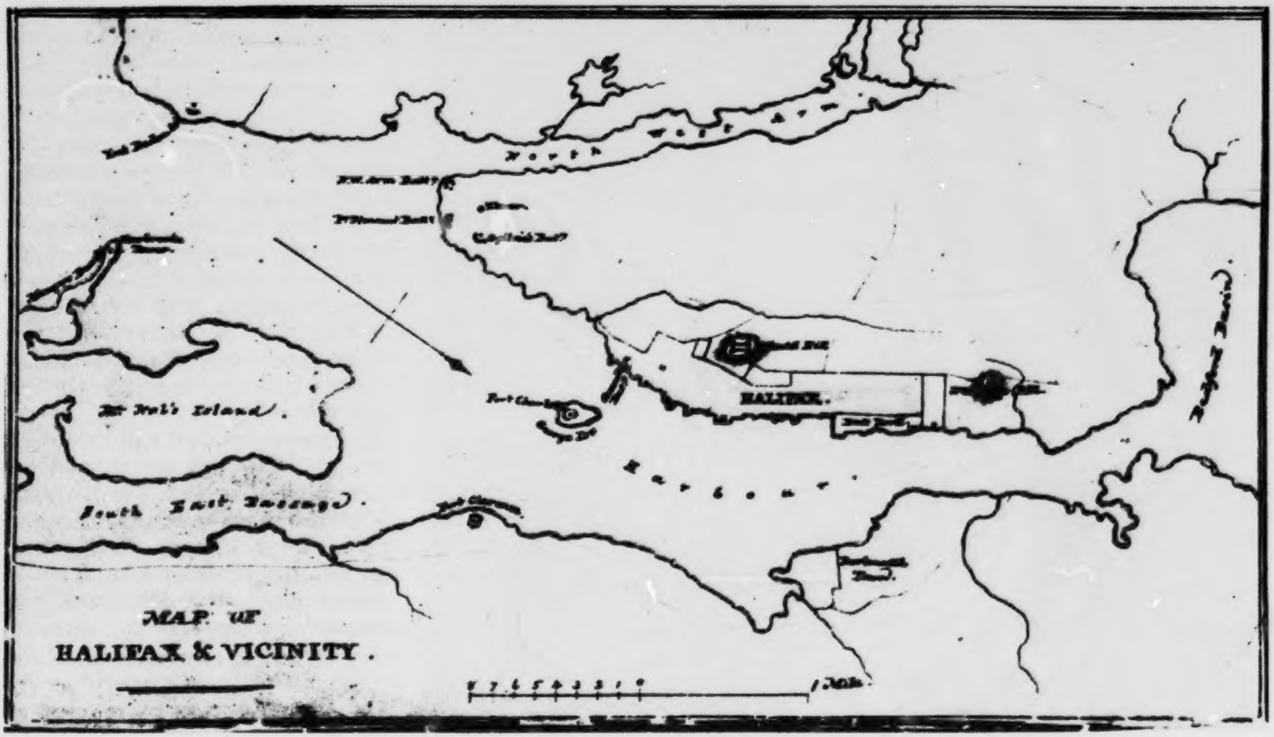
3 Colonel Gustavus Nicolls, RE. Portrait by his wife.



way as to give the commissioners the widest possible latitude in making their decisions. The problem was that Smyth and his fellow commissioners, in most cases, treated these suggestions with a reverence which their Victorian descendants usually reserved for Scripture. It was perhaps too much to expect that any engineer officer, no matter how competent, would have dared to contradict the duke himself, but it would have been better if Smyth had displayed a little more independence in carrying out his commission.

This absolute devotion to Wellington's ideas was not, in itself, entirely bad. Smyth, however, combined it with an incurable optimism in estimating the amounts of money needed to construct the various works he recommended. It is difficult to be precise about the extent of his optimism, since so few of the works recommended were actually built, but it is worth nothing that in almost all cases the amounts estimated by the Commanding Royal Engineers (CREs) on the spot exceeded Smyth's figures *(see* Table 1). Those works which were finally constructed all cost more – some of them far more – than the figures proposed by the commissioners. Smyth was, by all accounts, a competent officer, so one is at a loss to account for his poor judgement. Perhaps he was merely ignorant of Canadian building conditions. Possibly the unrealistic estimates reflect Smyth's familiarity with political conditions in England and his

4 "Outline map to illustrate a Report to His Grace the Duke of Wellington relative to His Majesty's North American Provinces" (1826). This map was inset in a large map of British North America drawn to illustrate the provisions of the Smyth report. It illustrates the relationship between the Citadel and the town and harbour batteries. The Citadel was too far north to be of much use in defending the harbour and inconveniently situated for the landward defence of the town. The map shows clearly why a supporting fort on Fort Needham Hill (north of the Citadel) was thought necessary. (*Public Archives of Canada.*)



awareness that excessive costs would deter Parliament from accepting his recommendations. In any event, the optimistic estimates contained in the final version of his report were to have serious consequences in the subsequent history of the Halifax Citadel.

Smyth's weaknesses were neatly complemented by those of the engineer officer most directly concerned with designing and constructing the Citadel, Colonel Gustavus Nicolls. Nicolls and Smyth had much in common. Both had enlisted in the Royal Artillery in 1794 and had transferred to the Royal Engineers in the following year. Both had risen through the regimental ranks in identical stages until 1813, when both were promoted lieutenant colonel. At that point their careers diverged dramatically. Most of Nicolls's career had been spent in colonial postings. He missed the opportunities afforded to officers who had had the good luck to serve in the peninsular campaigns and at Waterloo, with the result that he was still a colonel in the Royal Engineers – a mere major in the regular army – in 1825. Smyth, on the other hand, had attracted the patronage of the Duke of Wellington, married very well and, as we have seen, served with distinction in Europe and had been at Waterloo. By 1825 he was a major general in the army and a baronet.[1] Nicolls may well have resented his contemporary's striking success, but his resentment was either tempered or hidden by a well-developed sense of humility.

Nicolls's letters to his superior officers make interesting reading. He never contradicted. He greeted suggestions with praise and gratitude. He was deferential and complimentary. He never ventured to criticize. He was quite capable of calling the attention of "His grace the Master General" (Wellington) to the fact that the neck of the Halifax isthmus bore "so strong a resemblance to the lines of Torres Vedras (that so effectively put a stop to the success of the French in Portugal . . .)" that he could not "refrain from noticing it."[2] Occasionally this weakness completely usurped his better judgement. In 1830, Lord Beresford (the Master General of the Ordnance at the time) differed with Nicolls's strategic assessment of a local prominence known as Cape Hill near Annapolis Royal. Beresford based his objections on a vague memory of the geography of the place; he had served there as an ensign forty-odd years earlier.[3] Nicolls, whose acquaintance with local conditions was of a decidedly more recent vintage, did not venture to disagree. Instead he drew up plans for a work for the hill which he took the liberty of "naming Fort Beresford . . . it having emanated from His Lordship's recollections from having quarters at Annapolis."[4]

Gustavus Nicolls, therefore, was the last man either to resist the suggestions or to contradict the financial judgement of Sir James Carmichael Smyth, especially since the latter had the backing of so formidable a figure as the Duke of Wellington and good relations with virtually every senior officer in the engineer corps, from the aged Gother Mann (the Inspector General of Fortifications) on down. Picture the two men touring the defences of Halifax in the late summer of 1825, Smyth suggesting, Nicolls agreeing and enlarging on the suggestions. Between them, they fathered the present Citadel. They were also largely responsible for the disasters which befell their inadequate and slightly peculiar offspring.

II

In the case of the Citadel, Wellington presented the commissioners with the most ambiguous of his suggestions:

> *It would be most desirable to look at the ground upon which Fort George at Halifax, now stands, with a view to either its reform or the construction of a work of larger capacity upon that ground by way of keep to the works destined for the defence of the harbour, which might be garrisoned by two or three hundred men.*[5]

This contradictory passage reveals the duke's fundamental uncertainty about the strategic value of the hill in the overall framework of the Halifax defences. It appears to suggest that the Citadel was less important than the harbour defences. On the other hand, it does not reject outright the possibility of a major building on the site. But it does indicate that Wellington had in mind a modest work, and it does not explicitly mention the possibility of permanent construction.

When Nicolls and Smyth came to consider the duke's recommendation, they decided that a "work of larger capacity" was clearly called for. To make a case for such a work, a variety of reasons was given. The commissioners argued that a work on the hill would

> [protect the town] . . . *support . . . the sea batteries, . . . give confidence to the troops and militia advancing to meet an advancing enemy, and . . . enable the General Officer in command to move to any other part of Nova Scotia with his disposable force . . . without exposing his stores . . . to be taken and destroyed.*[6]

Smyth himself added the argument that expenditure on a permanent work would, in the long run, be cheaper than piecemeal expenditure on temporary fortifications.[7] He also elaborated on what, in his opinion, was the nature of the threat to the town.

> *In Canada and Halifax the enemy is at our door. If our minister in Washington is deceived, if our generals are indolent or supine, a war may be declared and an invasion take place before the ministry in England are aware that hostilities are even contemplated. The construction of the fortress as proposed becomes consequently more urgent and indispensable.*[8]

Nicolls's contribution to the debate was phrased in his usual manner:

> *SirJames C. Smyth has assigned several good reasons for the construction of a work on Citadel Hill, – I will take the liberty of adding one more, – viz. the good effect it would have on the Morale of the natives, as well as the contrary on that of their neighbours the Americans, who when on their frequent visits to this harbour, see its shores bristling with cannon on every side, and the British flag flying on the Citadel, on a fort respectable and strong for this side of the Atlantic, are thoroughly deterred from making an attack on Halifax.*[9]

Despite its language, Nicolls's explanation of the reasons behind the building of the present Citadel is the only one which makes much sense. None of the explanations dealt at any length with the strategic value of such a work, and indeed the meager explanations which were offered were contradictory. In an era when the largest gun in common use in the British army had a maximum range of just over 3,000 yards,[10] the Citadel could not effectively support the sea batteries. A gun mounted on the extreme southern end of the hill could only mask Georges Island and the middle reaches of the harbour – neither of which was an important factor in the event of a sea-borne attack. Nor was the hill in itself particularly well situated to defend the town against a land attack. Nicolls himself admitted that the first line of defence against such an attack would be the neck of the Halifax isthmus, which was out of sight of the Citadel.[11] The commissioners conceded that the hill could be properly defended only if it were supported by temporary works on adjoining high ground (notably Fort Massey Hill) and a permanent work on Needham Hill to the north.[12]

The best that could be said was that the Citadel, supported by the works described above and by a field army, could assist in the defence of the town against a land attack, and in this sense was intended as a keep. However, "keep" can mean any work, from a blockhouse on upward, and one wonders if perhaps a less elaborate work (like Captain Fenwick's towers) would not have served the purpose equally well.

No one connected with the project, with the possible and ironic exception of Nicolls, ever seems fully to have understood the fallacy in the strategic reasoning behind it. There is no evidence, at least in North American documents, that any questions were raised about the scheme, except in terms of purely technical aspects of the final design. Wellington's tentative and ambiguous assessment of the value of a work on the hill was accepted, and the commission recommended, without reservation, the present work on Citadel Hill.

III

The actual design was Colonel Nicolls's work. It is impossible to determine how much of it was contributed by Smyth and his fellow commissioners; their report is not sufficiently specific. They pronounced themselves in perfect agreement with Nicolls on the principles upon which he proposed to base his design, and enjoined him to submit plans and estimates at his "early convenience."[13]

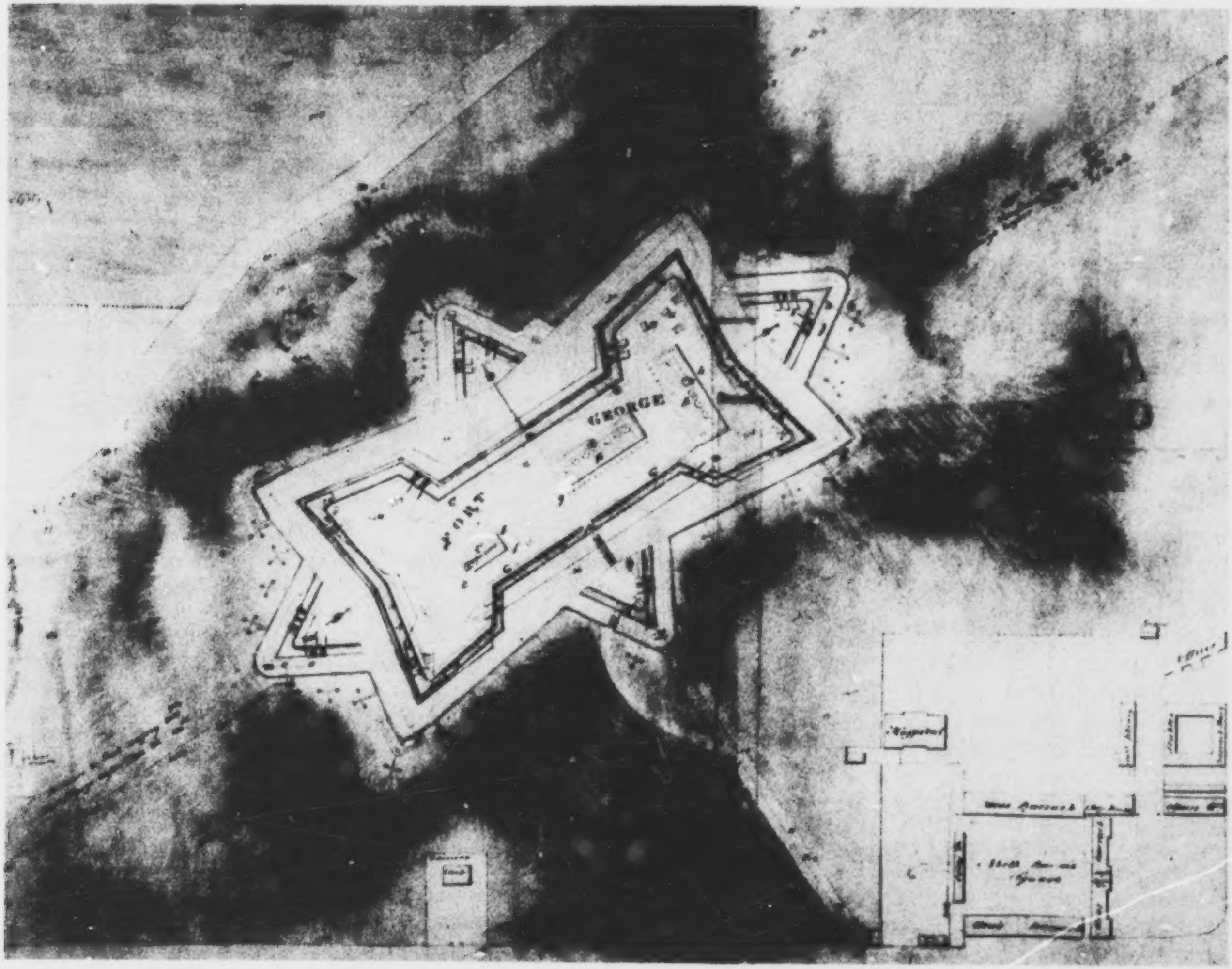
The commissioners did, however, impose two restrictions, both of which were to have serious consequences. The first involved the question of the labour force for the new work.

> [Colonel Nicolls] *states that in turning the arches and other important parts of the construction of a fortress, which require great attention and superior work, he would prefer not employing contractors. . . . We . . . agree with* [him] *that it will be desirable to employ a company of Sappers in Nova Scotia, but we still recommend that whatever can be done by contract should be agreed under proper securities and subject to a vigilant superintendance.*[14]

This decision led directly to the employment of contract labour in the building of the escarp walls, which was to have dire consequences a few years later.

The second restriction imposed by the commissioners was concerned with the estimated cost of the work. The commission decided, with its usual optimism, that the fortress would cost about £160,000.[15] Most of the other engineers involved in the design of works recommended by the commission blithely disregarded the commissioners' estimates, but

5 "Plan Nº 1" (1825). This was Nicolls's original plan for the Citadel. In the course of construction, the eastern from was redesigned, the north cavalier and the caponier were abandoned, the magazine was demolished and new magazines and additional casemates were added. Despite these changes, the west, north and south fronts as finally constructed are virtually identical with the original design. *(Public Record Office, London.)*



Colonel Nicolls was of a different nature. He adhered to the estimates so scrupulously that he found himself forced to compromise in fundamental matters of design in order to keep the costs down. The exact nature of his compromises will be discussed later in this chapter.

IV

Nicolls drew up his plans and estimates, which were duly dispatched on 20 December 1825. "You will easily perceive," he wrote to Mann, "that the trace has been formed more to answer the extent and nature of the ground than according to any regular system of fortification."[16] It had indeed; compared to textbook plates, the trace was peculiar. It resembled a stubby arrow, feathered at both ends. For this oddity Nicolls proposed to spend a total of £115,999 16s. 3 3/4d.[17] Despite its peculiarities, General Mann could easily have discerned in Nicolls's plan echoes of earlier proposals and suggestions for fortifying the hill, including at least one of his own.

The title page of Nicolls's estimate reads: "General Estimate of expense of *reconstructing* in masonry, *altering* and *adding* to Fort George" (emphasis mine).[18] This insistence on the relationship between Nicolls's design and the third Citadel (Straton's) is particularly appropriate. The two had much in common. Both contained four bastions and were alike in outline;[19] both made use of cavaliers. Nicolls's ramparts were at least as high as those of his predecessor, and were occasionally higher,[20] despite the fact that in his excavations of the fort's interior, Nicolls had cut down the crest of the hill by as much as 20 feet. There were divergences, most of them resulting from one factor: Nicolls's use of permanent building materials. He was, therefore, able to make use of elaborate fortification techniques which had been denied Straton.

The greatest difference between Nicolls's and Straton's traces of the fort, however, was in their respective conceptions of the difficult northern and southern fronts. Nicolls considered Straton's trace unacceptable; the fronts were "so short as not to admit regular flanks."[21] Both Fenwick and Arnold had proposed solutions for this defect, but Nicolls discarded both men's ideas and selected a method which Arnold had previously rejected, that of flanking from reverse fire casemates in the counterscarp.

The individual elements of fortification which Nicolls used fell into two classes: those which his predecessors had proposed and which had never been built, and those which (so far as we know) Nicolls originated himself. The casemates and caponier come under the former heading; the counterscarp gallery, countermines and ravelins come under the latter.

Casemates had found their way into both Fenwick's and Arnold's plans in one way or another, but in neither plan had they been put to such a variety of uses as in Nicolls's design.

In so small a work without casemated cover, troops may be shell'd out immediately.

The smallness of the work also admits of but a weak diverging fire being brought on the ground around it. By Casemated Cavaliers this fire is greatly increased and the Troops have at all times a Barrack secure from shells. – And for this reason as being the most exposed, I have also placed a Casemated Defensible Guardhouse on each of the . . . Ravelins, there not being a Covert Way.

The ditches of the Ravelins have been flanked by Casemates in the Body of the place, – the fire from the interior outwards, when it is to be procured, being preferable to that from the exterior outward.[22]

In all, Nicolls proposed a total of 34 casemates including 16 single-storey casemates in pairs under the ramparts, 7 two-storey casemates in each cavalier, and a casemated guardhouse in each ravelin. Of the total, 20 casemates (those in the ravelins and under the ramparts) were intended primarily for defence; the remainder were to be bombproof barracks.

The caponier was to serve two purposes; it was to be a flank defence for the west ditch and a communication with the west ravelin. The idea of using the caponier to defend the west ditch had first appeared in Arnold's design for the northern and southern fronts, outlined in his letter of November

1825. (*See* ". . . we have nothing on Citadel Hill but a heap of ruins . . . ," above.)

Nicolls may have planned a counterscarp gallery and countermines because it was impossible to form a covert way as a first line defence. In any event, he seemed to consider them to be a logical outgrowth of the four reverse-fire casemates.

> [The north and south fronts] *have . . . been flanked by casemates of reverse fire from the Counterscarp which also serve as Galleries for Mines, and I have included in the Estimate a Counterscarp Gallery around the direct Galleries to run out 20 feet beyond them allowing for Mines being exploded at that distance without injuring to* [sic] *the Counterscarp, or that low Galleries may be made to branch out at leisure.*[23]

The counterscarp gallery was a relatively unusual feature. Ravelins, on the other hand, were common in bastion fortifications, but none of Nicolls's predecessors had proposed their use. Straton lacked the wherewithal to build them properly, and ravelins on the northern and southern fronts as he designed them would have made the fronts look ludicrous. The spirit of Fenwick's design was such that ravelins would have been entirely irrelevant. According to Arnold's plan, there would have been insufficient room for them on the eastern and western fronts. Considering the size of Nicolls's ravelins on those sides, Arnold may very well have been right.

Arnold recommended, as we have seen, the occupation of a good deal of ground on the northern and southern fronts, beyond the limits of Straton's trace, to provide adequate flank defence and to take advantage of the commanding nature of the ground. This second reason presumably justifies Nicolls's occupation of much of the same ground with ravelins.

Three of the ravelins, those on the north, west and south fronts, were basically alike. In each of them, the guardhouse was placed in the centre of the gorge and was surrounded by a shallow ditch which took up most of the area beneath the ramparts in the ravelins' interior. The only important differences among the three were, first, the size of each (the northern and southern ravelins were identical and larger) and second, the means of access. The north and south ravelins were to be "entered from the ditch by wooden steps to be drawn up into the Guardhouse"[24] while on the western front there was to be a casemated two-storey guardhouse, the lower storey of which was to connect directly with the caponier.

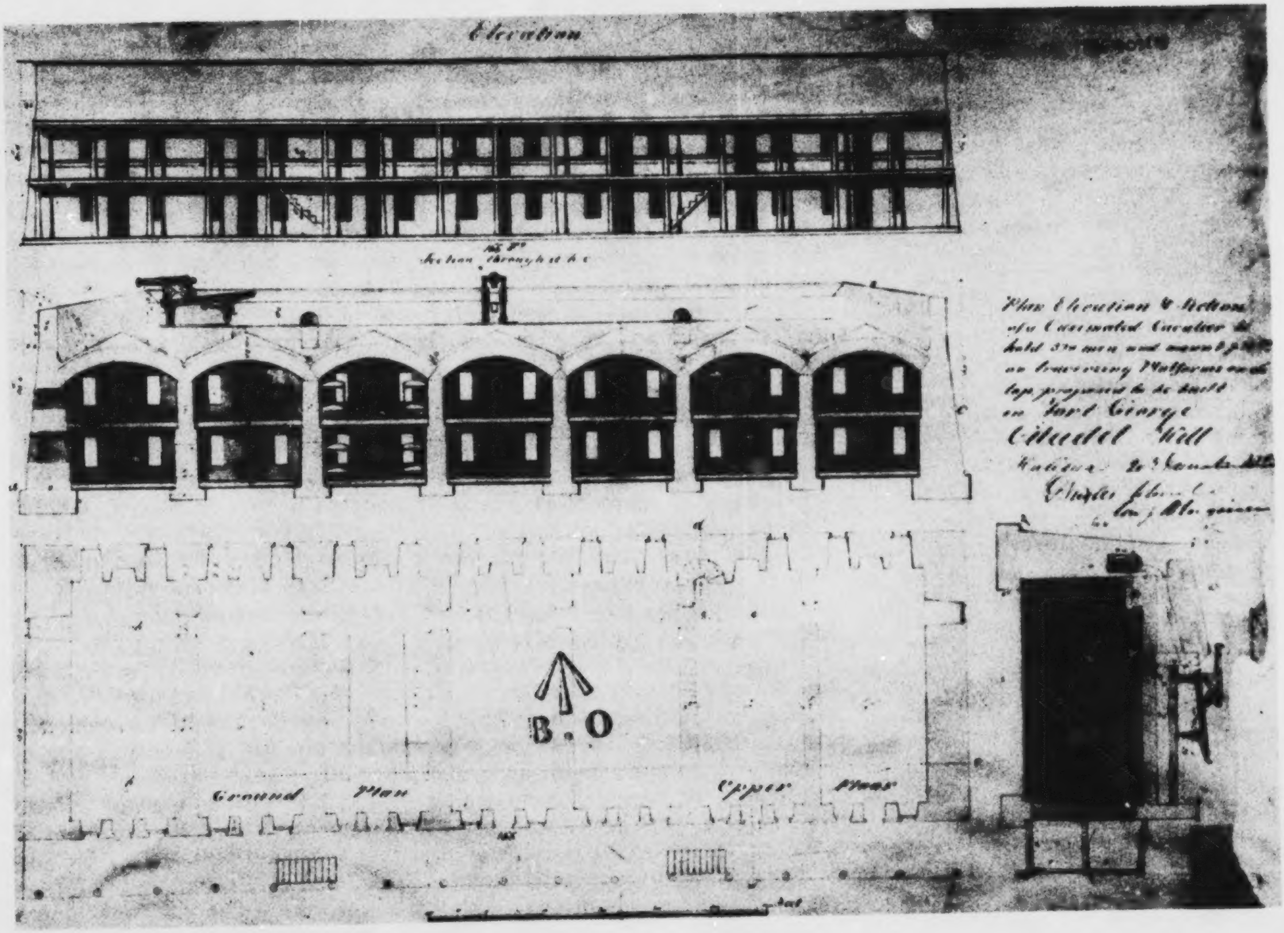
The east ravelin connected to the body of the work by a bridge which entered at the mid-point of the gorge. Another bridge, approached through a passage under the ramparts on the right face, led to the exterior. In the eastern ravelin, the guardhouse was shaped irregularly and had no ditch. It was located on the left side of the gorge, immediately adjacent to the ramparts.

The shape of the fort made its interior cramped; the distance from curtain rampart to curtain rampart was less than 150 feet. It would seem that the four bastions were intended to be hollow, although contemporary plans vary on this point. The ramparts on the west side were somewhat thicker than those on the east;[25] this allowed more space in the northern and southern ends.

What interior space there was in the northern end of the fort was almost entirely taken up with the two identical cavaliers, one on a north-south axis between the curtains, and the other on an east-west axis fitting rather snugly between the bastions. Each consisted of seven two-storey casemates surmounted by a masonry and earth parapet, a terreplein, possibly of wood or earth (neither the plans nor the contemporary documents are explicit on this point) and curbs and racers for seven guns on traversing platforms. Both cavaliers were intended as quarters; the northern one was to be "a convenient Barrack for 320 men" and the eastern one "Officers Quarters for 4 Captains and eight Subalterns."[26]

Certain peculiarities in the design of these buildings deserve comment. For one thing, the only provision made for access from the lower to the upper storeys of the casemates was by means of staircases in a wooden verandah which was to

6 "Plan Nº 3" 1825. This, Colonel Nicolls's original design for the cavalier, was much altered in the course of construction. *(Public Record Office, London.)*


Elevation
Section through a b c
Plan Elevation & Sections
of a Casemated Cavalier to
hold 3?0 men and mount
on traversing Platforms on its
top proposed to be built
on Fort George
Citadel Hill
B. O
Ground Plan
Upper Floor

run along the interior side of each cavalier. As it was intended to remove the verandahs (to keep them from being set on fire) during an attack, it is interesting to speculate how Nicolls intended, in such a situation, to get men and ammunition to the guns on the roof. Another odd detail was the arrangement of the chimneys for the fireplaces in the casemates. The chimneys were to run through the exterior wall and emerge flush with the masonry parapet on the roof. Obviously Nicolls intended never to light fires during a siege.[27]

Nicolls provided no detailed account of the armament proposed for the work. It is likely that he had no more than an approximate idea of the type and calibre of the ordnance to be mounted as he drafted his plans. He did make allowances in his estimates for platforms and embrasures in the appropriate places, as well as for traversing platforms in each of the north and south ravelins – two in each face – as well as four traversing platforms in the west ravelin and three in the east. He planned one embrasure at each of the bastion and ravelin salients, and seven on each of the cavalier roofs. The plan also shows two mortar platforms in each of the western bastions.[28] The 16 rampart casemates were intended to mount guns. The total number of gun positions would have been 63, a number which may be taken as an approximation of the number of guns intended for the work.

The fort was provided with seven sally ports. One of them provided access to the caponier. There were two in each curtain, and one in the re-entrant angle of both northern and southern fronts, all leading to the ditch. The two in the western curtain emerged opposite the rudimentary place d'armes flanking the west ravelin; they therefore provided access to the only defensive position proposed for the top of the glacis.

VI

Nicolls did not give a detailed account of the dimensions of the works in his proposed fort at any point in either his estimate or his covering letter. The estimate, in fact, gave only a cursory account of the cost of each individual work, without detailed calculations of materials, labour and workmanship involved. The only entries which come close to accounting for the extra services necessary for construction on the scale Nicolls proposed are as follows: a recommendation for the purchase of 12 horses "for the service of the work;"[29] one entry for £385 for "scaffolding, wheeling, planks, etc.," and another entry for £585 for "Repairs to tools, etc."[30] Similarly, there were few references to building materials. The estimate called for "granite quoins at the Salient angles of the shoulder [*sic*] of the bastions," but did not specify the type or quality of stone to be used in the remaining 99 per cent of the escarp wall.[31] The whole question of labour was dealt with in a single paragraph.

> *The Estimate has been formed on the Principal of Workmanship being performed 3/4 by Civil Artificers 1/4 military. . . . – But this will vary materially according to the circumstances, as well as in regard to the Military assistance to be had as what part of the workmanship may be performed by contract; which I may offer my opinion, as to works of Fortifications I consider not likely to be more economical or the works to be equally well performed as by military Artificers, supposing the principal part to belong to the Corps of Royal Sappers and Miners; – as to stone, the principal part of the material, I much doubt the Department obtaining it by contract as cheap as by quarrying.*[32]

This last sentence is the only reference to the manner of supplying the raw materials, except for a recommendation that the necessary bricks be sent from England as ballast, "as the Bricks here are of very inferior quality."[33]

Nicolls's estimate was, therefore, somewhat less precisely worded than one might expect. This made it easier for the colonel to conceal the compromises he had made in formulating the design. There were two major ones: the retention of the old powder magazine and the unusual thinness of the escarps.

Nicolls retained the powder magazine he himself had built in 1812 for use in the new Citadel. The magazine was a stone, bombproof building with a capacity of

1,344 barrels of powder,[34] located in the new fort at the southern end of the eastern curtain. In his covering letter, Nicolls mentioned it only once, to note that it could be advantageously used in the new work.[35] Nicolls's own section drawings clearly showed that the floor of the old magazine was 10 feet higher than the proposed level of the parade square of the new fort. Moreover, the magazine roof was somewhat higher than the adjacent ramparts.[36] Nicolls mentioned neither fact in either his covering letter or his estimate, and this omission seems to have gone unremarked in London.

Nicolls's escarp sections were another, less obvious problem. It is difficult to ascertain the dimensions of the escarps. In this, the modern researcher is a good deal better off than the gentlemen in the Fortifications department were at the time, since he, at least, has access to the contract specifications of 1828, 1829 and 1830. The Fortifications department had no information whatsoever in Nicolls's estimate and covering letter; their only guides were his section drawings. These were contrived in such a way that, in almost all cases, they showed the escarp where it was broken either by a sally port or by the gate.[37] This circumstance, obviously, made accurate measurement of the escarp almost impossible. It also obscured the fact the Nicolls's escarp sections were rather less substantial than the fortifications textbooks permitted. A comparison between Nicolls's

Table 2. Nicolls's Escarp Profiles compared to Vauban's recommended Dimensions for Escarps of similar Size* (all measurements are in feet)

	Vauban		Nicolls		
	1	2	3	4	5
Height of wall	20	30	20	25	30
Thickness (base)	9	11	7	7	9
Thickness (top)	5	5	3	4	3
Buttresses (length)†	6	8	5	5	5
Buttresses (width)§	4 to 2′8″	5 to 3′4″	–	4	–
Buttresses (height)	20	30	15	25	24

*Columns 1 and 2 are derived from John Muller, *A Treatise Containing the Elementary Part of Fortification . . .* (Ottawa: Museum Restoration Service reprint, 1968), p. 50; column 4 is derived from PAC, MG12, WO55, Vol. 1558, part 7, p. 50; Columns 3 and 5 are derived from NHPSB Plan 02-1825-12-2. These last figures are less accurate than the others.
†Measured at right angles to escarp wall.
§Greater figure is width next to wall.

escarps and Vauban's recommendations (*see* Table 2) shows that Nicolls's escarps were, on the average, two feet thinner than they should have been. The same comparison also reveals that Nicolls's buttresses were up to three feet shorter than Vauban recommends, and did not in all cases run up the whole height of the wall.[38]

VII

It is difficult to assess Colonel Nicolls's design for the Citadel. On the one hand, it is a competent piece of work, more sophisticated than previous plans and better adapted to the site than any of them, with the possible exception of Arnold's. On the other hand, Captain Fenwick's towers would have been cheaper and strategically more suitable for the hill. Nicolls's fort is admirable enough in itself, but its utility can be questioned. It is doubtful whether there was any purpose for the fort other than the one Nicolls himself suggested: to show the flag.

The suitability of the work, however, is not as important to its subsequent history as the adequacy of the specifications for its components set forth in Nicolls's estimate. These were demonstrably insufficient to meet the demands of the local climate and soil conditions. The work had barely gotten under way when their insufficiency became embarrassingly obvious. Within four years of the beginning of construction it was apparent that major alterations (and more money) were necessary if the work was to be properly finished. By a misguided but entirely characteristic attempt to please his superiors, Nicolls not only put his own competence as an engineer seriously in question but also delayed the completion of the Citadel by almost a quarter of a century.

". . . I now think I made a little too free with the Climate. . . ."

I

In the hierarchy of the Ordnance in London, the office most directly concerned with the Halifax Citadel was that of the Inspector General of Fortifications. Like so much else about the Ordnance, the title was something of a misnomer. The Inspector General in fact supervised all the activities of the three Ordnance corps – the Corps of Royal Engineers, the Royal Regiment of Artillery, and the Corps of Sappers and Miners. Fortification was only one of the Inspector General's responsibilities. He could not make major administrative decisions (i.e., those involving policy or money or both). These were referred, through the Secretary of the Ordnance, to the Master General and Honourable Board of His Majesty's Ordnance. Theoretically the process was simple enough; the secretary was to lay the matter, whatever it was, before the Master General and board and the latter two were to render a decision. But in reality the process was somewhat different. Despite the imposing formulation, the Master General (invariably a soldier) and the civilian board rarely had much to do with each other, and neither, in most cases, actually made decisions. The important figure in most transactions between the Inspector General and the board was an intermediary, the secretary (properly, the Secretary to the Board of Ordnance). This gentleman was the permanent departmental under-secretary, roughly the equivalent of a modern deputy minister, and his recommendations were usually accepted.

An example will serve to illustrate the workings of the department. The Commanding Royal Engineer at a station would address himself directly to the Inspector General. If a decision was necessary, the Inspector General would write to the secretary, enclosing the engineer's letter and any other documents he considered relevant, giving his opinion and requesting a decision. The secretary would then go through the motions of presenting the case to the Master General and board. In some instances, if the matter was sufficiently important, the Master General would either write a memorandum on the subject or would minute the margin of the engineer's letter. The secretary would then compose a short letter rendering the decision and return it, along with the original correspondence and any marginal annotations acquired since, to the Inspector General, who would then refer it to one of his deputies for transmission back to the station. The whole process *could* take only a few days. More commonly it took months and occasionally years.

In the summer of 1828, the key positions in the Ordnance were held as follows:

Inspector General of Fortifications: General Gother Mann
Deputy Inspector General: Major General Sir Alexander Bryce
Secretary to the Board of Ordnance: Richard Byham
Brigade Major, Corps of Royal Engineers: Lieutenant General Charles Grene Ellicombe

The Master General, Lord Beresford, had held office for only a few months, and Byham only since 1827. Mann, who had been an engineer for 65 years, Inspector General for 17, and a full general for 7, was, for the moment, the most powerful man in the Ordnance.[1]

II

The Inspector General's office acknowledged receipt of Nicolls's Citadel scheme on 21 March 1826.[2] Nothing further was heard on the subject for more than two years. Mann contented himself with referring the plans to Sir James Carmichael Smyth for comment, and, when the latter pronounced himself satisfied,[3] allowed the subject to drop. It was not until parliamentary approval of the necessary funds was imminent that Mann formally submitted the scheme to the Master General and board for approval.[4] His accompanying letter was terse. "I concur with the opinion of Sir James Carmichael Smyth of its [the plan's] fitness for the situation and that the estimated expense, £115,999 appears moderate and, if the measure be adopted, one of great economy." Despite the fact that it was already almost July, he proposed to ask for £15,000 for construction in the current year.

The Master General was in complete agreement. His only contribution was a comment on building methods appropriate to North America. "No more length of work should be laid down than could be completed to the top during the season as covering it for the winter frost occupies much time and is very expensive."[5] In fact, no one connected with the higher reaches of the Ordnance seemed to be too concerned about the project. The following day, 17 July 1828, Byham dispatched the letter of approval of the project to the Inspector General.[6]

Before sending the letter on to Halifax, Bryce appended a couple of suggestions as to how the scheme could be improved. The most important one concerned the cavaliers. [Colonel Nicolls] *is requested to consider whether it might not be advisable to construct the casemated cavaliers in four distinct positions . . . placing one in each Bastion across the Capitals . . .* [this] *would . . . have the advantage of furnishing a powerful Blockhouse or retrenchment in each Bastion without lessening in any degree the accommodation for Troops & Stores.*[7] This was London's only quibble with the proposals, and it was added, almost as an afterthought, on the same day that Colonel Ellicombe drew up the covering letter for transmission to Nicolls. Approval had taken only 36 days. Never again would a major decision regarding the Citadel be made so quickly.

III

For almost three years, the Citadel project had been in limbo. Now that official approval had finally been granted, a whole host of difficulties had to be dealt with. For the remainder of the 1828 working season, Nicolls confined himself to doing some preliminary excavation and addressed himself to the formidable task of finding the materials and workmen necessary to begin building in the following year. In October he sent a progress report to London.

I have made a commencement in excavating the ditch of the West Ravelin which being the lowest part of the West front (the most important) it is necessary should be first excavated in order to afford free water course for what would otherwise be pent up in the ditch.[8]

He detailed what he proposed to construct in the following year: the west ravelin counterscarp and part of the west escarp. The first was to be built by soldiers (Royal Sappers and Miners and artificers from the line regiments) and the second by civilian contract.

Nicolls anticipated trouble in procuring enough skilled workmen, so much so that he recommended hiring 20 civilian masons in England and shipping them to Halifax for the working season. He also noted that there were only two brickmakers in Halifax and that local supplies were, in consequence, both insufficient and excessively expensive. He therefore recommended that 100,000 bricks be sent out from England. He concluded his report by agreeing with the Master General's directive about construction methods, but noted that an exception would have to be made in the case of the cavaliers, since "it would not be advisable to construct the whole in one season. . . . [The] arch part, which must thereby be done late in the season would never become thoroughly dry, or might even yet be affected by the frost." He proposed erecting the cavalier up to the springing of the arches in one season and turning the arches in the following spring. He did not think that this would be either dangerous or expensive, since the standing walls could be protected for the winter by the scaffolding.

In a second letter, Nicolls dealt with Bryce's suggested alterations to the cavalier. These he rejected. He considered the northern and western cavaliers to be necessary, the one to cover Camp Hill and the other to enfilade Needham Hill; their function would be impaired by placing them across the capitals of the bastions. He did, however, admit that a third cavalier facing Fort Massey Hill to the south might be desirable, and suggested splitting the north cavalier, leaving four of its seven arches in the original location and removing the other three to the south end of the fort. He concluded,

this division might keep the defence more in equilibrio, but will cause some increase of expense, requiring 2 additional abutments 8 f^{t}. thick – instead of one centre pier of 4. . . .

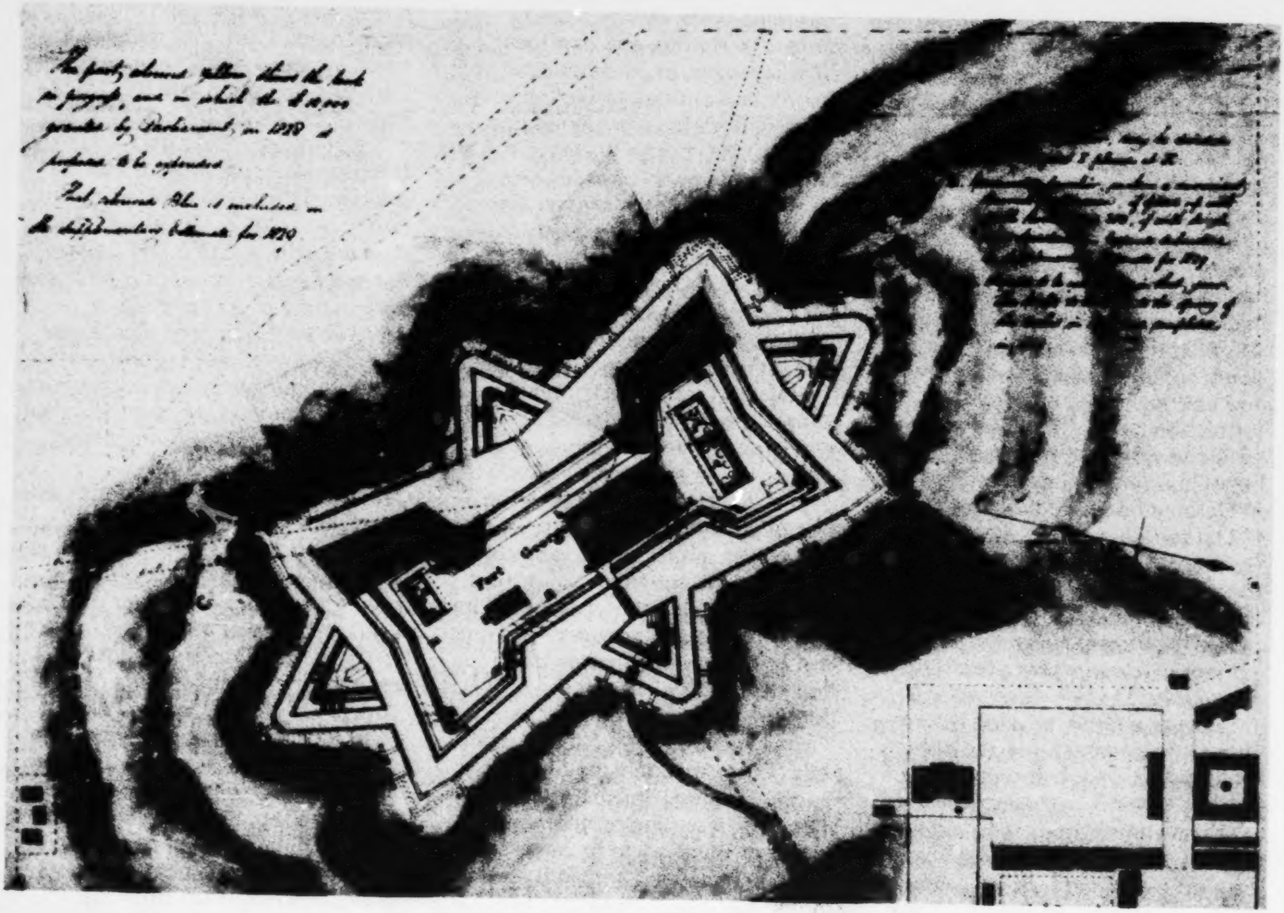
By allowing the [west] *Cavalier B to remain on its present site and dividing* [the north cavalier] *A into two* [north] *A, &* [south] *K, each flanking* [the west] *B and being flanked by it, it would only be necessary in time of war and alarm, to build up and loop hole their lower doors and windows to form a most powerful Retrenchment within Fort George; which Work is on too small a scale to render a Retrenchment in each Bastion necessary.*

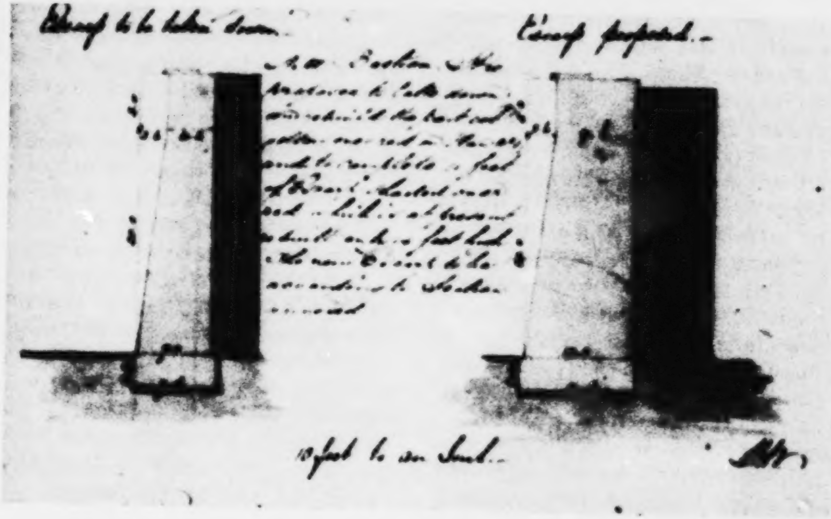
The last paragraph of the letter was pure Nicolls:

In offering these explanations, it is with much deference I differ in opinion with Sir Alexander Bryce, even though that difference is in the local, in the principles recommended in his suggestions I entirely concur.[9]

In fact, Bryce's suggestion was ill-suited to the realities of the site, and Nicolls had made a perfectly adequate rebuttal of it. Nicolls conceived of the cavaliers as gun platforms directed at specific targets and placed them accordingly. Bryce's conception of them as redoubts was more than a little ridiculous, given the situation. Examples of a garrison continuing to hold out when the enemy was busily engaged in setting up gun positions in the *interior* of the nearly captured fortress were rare, especially so in the case of a work as comparatively

7 Ground plan of the Citadel in October 1828, Colonel Nicolls's original design. It was drawn at the end of the first working season and shows the progress of the work. *(Public Archives of Canada.)*


The parts coloured yellow shows the work in progress, and on which the £10,000
granted by Parliament in 1828 is
proposed to be expended
That coloured Blue is included in
the Supplementary Estimate for 1829
Fort George



8 "Escarp to be taken down "and "Escarp proposed," 1834. The escarp to be taken down was built to the specifications of the 1828 contracts. The escarp proposed was the final variation on the standard escarp used to replace earlier failures. (*Public Archives of Canada.*)

tiny as the Citadel. Nevertheless, Nicolls felt obliged to whitewash his difference of opinion, first by subscribing to the redoubt theory, and second by denying that any such difference existed.

As it happened, Bryce and Mann never noticed the difference. What did strike them forcibly was that Nicolls had used that ominous phrase, "increase of expense." A terse reply was drafted within days of the arrival of Nicolls's letter. General Mann agreed with Nicolls's proposal and requested an estimate, "provided it should not exceed the expense originally estimated."[10] Nicolls was given no indication of how this could be done. Once again, in an attempt to please his superiors, he had talked himself into a corner.

IV

Nicolls spent the remainder of the winter of 1828–29 attempting to solve the problems outlined in his letter to Mann. His task was made easier by the fact that his request for stores and civilian masons from England was quickly granted (although the wording of the letter left in doubt the number of masons to be hired),[11] but by this time another difficulty had arisen. Up to that point the Engineer department in Halifax had apparently never owned a quarry. In November, Nicolls wrote to Mann outlining the steps he had taken to get possession of a suitable site in Purcell Cove. The property had been escheated to the crown in the preceding year. Nicolls needed money to develop it – specifically £47 10s. 10-1/4d. for a wharf and roads, and he now requested that London approve the expenditure.[12]

While he waited for a reply, Nicolls turned to the business of finding a civilian contractor for the escarp wall. Early in November tenders had been called.[13] It had been specified that no builder could contract for less than 300 feet, that the work was subject to the inspection of the Engineer department, and that the contractor was to supply his own scaffolding and materials, except for the stone itself, which was to be ironstone from the department's quarry. On 6 December, Mr. William Flinn contracted to build 400 feet of escarp on the terms specified at 12s. 9d. per perch.[14] (A perch of masonry was 24.75 cubic feet.) A bond of £1,000 sterling was posted by Messrs. Barron and Trider, guaranteeing performance of the contract. A few days later, a second contract was let to Mr. Peter Hays. The second contract was identical except that, for some reason, Hays got a better deal – 13s. 8-1/2d. per perch.[15] The wording of the contracts was vague enough to give rise to questions about their legality some years later (*see* below), but for the moment Nicolls's immediate problems were solved.

There remained the question of the labour force. A large proportion of the force was drawn from the garrison regiments, and Nicolls depended on the good will of the general officer commanding to ensure an adequate supply of workmen from this source. Throughout the winter, Nicolls had supposed that his major problem would be to find enough civilian labourers. In early May he got a nasty jolt. His brother officers were less than enthusiastic about cooperating. A routine request for an increase in the Citadel working party from 100 to 150 regular soldiers touched off a row when Lieutenant Colonel Harris, the deputy adjutant general, revealed that Lieutenant General Maitland, commanding the forces in Nova Scotia, was unhappy about the number of men engaged in work parties.

> *It appears . . . that from the number of Soldiers employed in the Public Departments either as Workmen or on Fatigue, the daily Casualties and Garrison guards, the united strength of the three Regiments would amount to no more than 428 Privates, for all purposes of drill and other Military instruction during the Summer.*[16]

General Maitland disliked having an insufficient number of soldiers to drill and, as a result, decided to cancel all working parties on Wednesdays and Saturdays for the remainder of the summer.

This bombshell came on the very day when Nicolls had written a letter to one of the regimental colonels complaining that his men habitually arrived late and unattended by an officer, the officer "not arriving until some time afterwards."[17] Maitland's decision roused Nicolls to one of his few recorded examples of tactlessness. He replied to Harris, comparing the new attitude unfavourably with the cooperation he had received from Sir James Kempt (Maitland's predecessor), complaining that work would be slowed up under the new policy and requesting that at least a token force of necessary artificers be exempted from the ban.[18] The next day Nicolls repented of his rashness and wrote a more conciliatory epistle,[19] but by then it was too late. Maitland refused to rescind his order and it stood for the rest of the summer, although the general did relent to the extent of taking 10 men from the Georges Island work party and putting them to work on the Citadel at the end of May.[20]

On 24 June a company of the Royal Sappers and Miners and members of the Royal Staff Corps arrived.[21] If Nicolls expected them to alleviate the labour situation to any degree, he was mistaken. Less than two months later he was complaining bitterly about their abilities.

> *I by no means receive the assistance I expected from the 18th Company of Royal Sappers & Miners, lately sent to this Place. – it is generally deficient in good Workmen, and particularly so in Masons and Bricklayers; the non-Commissioned officers are but of comparatively little service on the works, the two Serjeants being* Collar Makers, *and the rest not particularly skilful in their trades.*[22]

He suggested that the vacant positions in the company be filled with skilled masons and bricklayers; otherwise it would be necessary to hire a civilian foreman "at additional expense." In the final paragraph of the letter, Nicolls had comments to make on the quality of the garrison soldiers as labourers.

> *The Staff Corps possesses some very good artificers, but I have kept them as much by themselves as the Service would admit, as it seems natural that Soldiers paid whether they work or not, and others paid according to their diligence and attention* [i.e., the Staff Corps] *are not likely to mingle well together.*

The soldiers who were "paid whether they worked or not" caused at least one incident with a civilian contractor in the course of the summer. Mr. Patrick Kelly, a carter, complained that he was being harassed by both the foreman and the working parties. The former was forcing him to overload his cart in violation of his contract. He claimed that one of the latter had threatened that

> *if they did not get* rum *from me they would break my trucks in loading and this they expressed in the presence of the Overseer of Labourers, whom I called upon to prevent such conduct, he made light of my entreaties and said he could do nothing about it.*[23]

Unfortunately for Mr. Kelly, his complaint fell on deaf ears. By the time it was written, Nicolls was convinced that the contractors were at least as much trouble as the troops, and was not at all well-disposed toward them.

In fact, by the end of the summer, Nicolls's relationship with his civilian contractors was beginning to resemble a farce with paranoiac overtones. The colonel had become convinced that most of the contractors were cheating, and laboured mightily to prove it. He had the trucks weighed, the hogsheads measured and the stones counted. Unfortunately for his peace of mind, every time he thought he had proved his case, he found himself thwarted by the deputy commissary general, George Damerum. It was Damerum's business to negotiate contracts and oversee the contractors, and it was his increasingly unpleasant task to demonstrate to Nicolls's satisfaction that most of the illegalities were, in fact, nothing more than misunderstandings.

As an example (admittedly an extreme one), take the case of William Roach, the contractor for lime. Nicolls, on measuring one of Roach's hogsheads, found it to contain less than he thought it should.[24] The difficulty lay in the fact that the definition of a hogshead, as set forth in the statutes of Nova Scotia, had inadvertently been carried over into the contract. According to the Nova Scotian government, a hogshead contained "8 Winchester bushels or 96 gallons."[25] Unfortunately the two measurements were not the same; 96 gallons was somewhat larger than 8 Winchester bushels. Roach insisted on the bushels,[26] while Nicolls held out for the gallons. No amount of persuasion from Damerum and ultimately from the general officer commanding could convince Nicolls that Roach in fact had a case. The correspondence on the subject dragged on into November and was finally settled by compromise only after Nicolls threatened to take the case all the way to the Treasury.

When the working season finally came to an end in mid-November[27] everyone was vastly relieved. While all concerned recognized that it had been an exceptionally bad year, they hoped that this only reflected the inevitable difficulties arising from the commencement of a major work. The next season, 1830, would see better results.

V

One reflection of the season's difficulties was the financial balance sheet. Parliament had granted £15,000 in 1828 and a further £15,000 in 1829,[28] for a total of £30,000. Of this only £10,595 had been spent.[29] Despite this, neither Nicolls nor London was unduly alarmed. In fact, Nicolls requested and got £20,456 18s. Id. on the Citadel account in the annual estimate for 1830–31, the largest amount ever granted in a single year for the project.[30]

One reason for optimism was that the two masonry contractors had managed to build their allotted portions of escarp within the required time. The system having worked so well, Nicolls saw no reason to change it. On 15 October Nicolls issued a specification for 1,000 feet of escarp; the wording of the specification was, in most respects, identical to that of the previous year.[31] The first contract was let to Mr. John Metzler on 8 December. It was for 500 feet of escarp at the rate of 12s. 7d. per perch.[32] The contract for the other 500 feet went to Peter Hays, who once again managed to get a better rate – 13s. 7-1/2d. per perch.[33]

The working season opened early in May with the usual wrangle with Harris about the number of men available for the working party.[34] Once work had begun, however, things went relatively smoothly. There were the usual problems with the labour force, but not to the same extent as in the previous summer. Similarly there were few open disputes about contracting. Nicolls contented himself with a protest to London over the wording of Damerum's contracts for truckage and supply (the building contracts had been largely the colonel's own doing). Damerum's contracts were, Nicolls contended, imperfectly worded and were open to criticism on that score.[35] Viewed in the light of subsequent developments, this was an ironic complaint.

By the end of the working season, much had been accomplished. A good index of the progress was the rate of expenditure. The work had cost £18,375 in 1830,[36] almost twice as much as had been spent in the two previous years put together. While it was true that neither of the two contractors quite completed the required 500 feet of escarp, Nicolls and the Engineer department were in a forgiving mood. On 4 November Peter Hays signed his third consecutive contract with the department, agreeing to complete the portion of the work left unfinished in 1830 and to build another 320 feet of escarp the next year, all for the price of 13 s. 7-1/2d. a perch.[37] Four days later Mr. Metzler signed a similar contract; he agreed to complete his portion of the unfinished wall and to build an additional 186 feet. He was to receive the same rate as Hays.[38] Both contracts were awarded on Nicolls's recommendation, without further tenders being called.[39]

The respective officers (Nicolls and other Ordnance staff) defended their actions on the grounds of continuity. There was no point in calling for new tenders, they argued: work by an experienced builder with knowledge of the project was safer and in the long run more economical than work by a new contractor.[40] Colonel Nicolls pronounced himself completely satisfied with the work done by Hays and Metzler.[41] The reports of both the respective officers and of Nicolls himself made special mention of the "well-shaped large stones" which Mr. Hays used.

Then, on 9 December, 50 feet of escarp in the southwest bastion, which had been built by Flinn in 1829, suddenly collapsed.[42] This was bad but not disastrous; Flinn was not, after all, one of the favourite contractors. If it could be proved that the collapse was the result of faulty workmanship, Nicholls had nothing to fear. He promptly submitted the documents relevant to the case to S. G. W. Archibald, the solicitor general of the province, to see whether legal action could be taken. Archibald replied on Christmas Eve. He was not encouraging.

> *I have carefully examined enclosed to me . . . and I am of the opinion under the Contract and the manner in which it was agreed that it should be executed that there would be great difficulty in this case of compelling the Contractor either to rebuild the wall . . . or to answer in damages for such rebuilding.*[43]

Even if Archibald had been more optimistic, it would have been little comfort for Nicolls. Two days earlier 70 feet of Hays's wall in the northwest bastion had also collapsed.[44] It must have been a very gloomy Christmas for the colonel.

It was not until 28 January that Nicolls addressed himself to the odious task of conveying the bad news to London.[45] The failure of Flinn's work was the easiest to explain; it had bulged as early as November 1829, and in consequence Nicolls had refused to give Flinn another contract. The work had been clearly defective from the start, although the legal situation was such that criminal prosecution was impossible. Hays's work was another matter. Nicolls was at a loss to suggest an explanation, though he did suggest that the stones used had perhaps been too small. Then, too, the climate was so damp that the mortar had never set properly. He noted the improvements which had been made in 1830 in terms of the thickness of the wall and the quality of the stone, and stated that he entertained no fears about the durability of the work built in that year. To strengthen subsequent building still further, he recommended thickening the escarp sections and using cement to point the faces. He noted that he had used contractors for reasons of economy and speed, since the reserves of military manpower were insufficient to build at so fast a rate. He concluded,

> *It is with much regret I have to bring a Report of the foregoing nature before you; and beg to assure you that I shall use my best endeavours to profit by the experience gained in the last two Years, and adopt circumstances as much as possible to this Climate, so very unfavourable for building massive walls to retain moistened earth. . . .*
>
> *I entertain hopes that the Hill will still be completed for the sum originally estimated.*

Unfortunately the memoranda and letters sent in reply to this letter are missing. One suspects that they made unpleasant reading. We do know that the Board of Ordnance was at the point of approving a grant of £14,931 on the Citadel account for the 1831–32 season when Nicolls's letter arrived, and that the amount was cut to £4,989, ostensibly because of the unexpended balances.[46] We can infer from Nicolls's reply to the missing letters that he was instructed to stop using contract masons after the expiration of the current (1831) contracts. We also know that Colonel Ellicombe addressed a personal letter to Nicolls, and we have Nicolls's reply. It is resigned and almost whimsical in tone.

Dear Ellicombe

I view your note of 2ᵈ March as kindly intended – and therefore thank you for it – However, I entertain little apprehension for any thing built at Fort George since 1829, in which year I now think I made a little too free with the Climate – but . . . I have written officially and fully on the subject . . . and there is little pleasure in repetition of this nature. . . .

We are hard at work at the Hill – but we get no Military artisans or Labourers, except Sappers and Staff Corps either for it or the Barrack service, on Wednesdays & Saturdays– This helps to increase the expense considerably, perhaps you could inform me whether this is according to the spirit of the times, and general custom where there are considerable Works carrying on.[47]

Nicolls's official response took the form of a letter and two estimates for the work which he had intended to have Messrs. Hays and Metzler do in the 1831 working season. The first was for 372 feet of north ravelin escarp; the second for 186 feet of curtain. The new estimates, which took into account both increased dimensions and the use of military labour, exceeded the old by a total of £957.[48] The plans were rejected. Fanshawe (the new brigade major) wrote on 29 June,

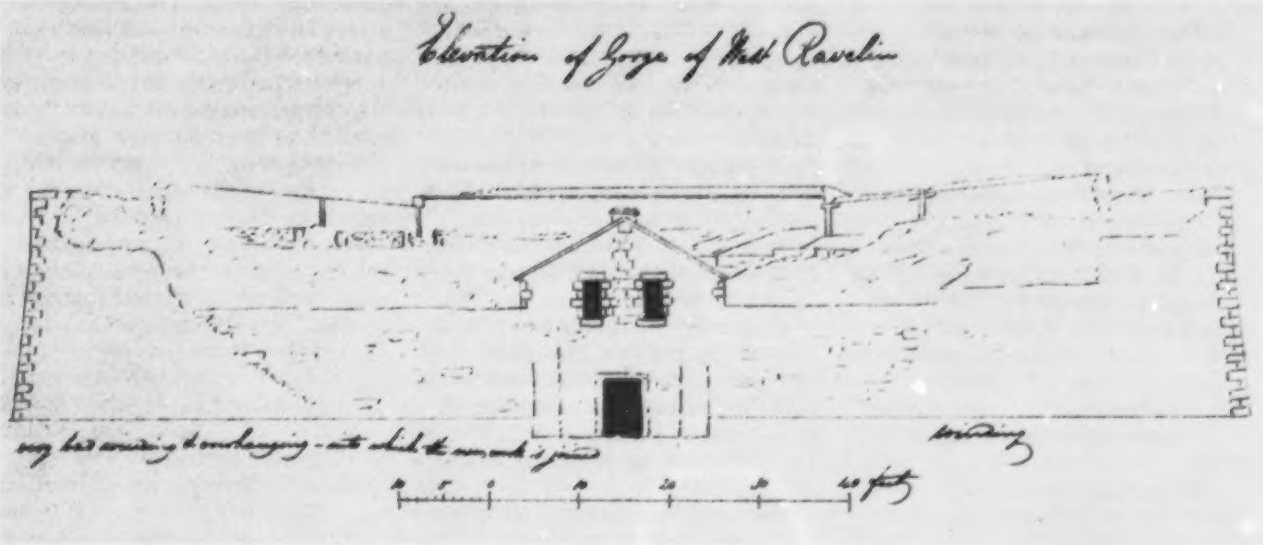
Sir Alexander desires me to say that he by no means feels confident with a climate such as that of Halifax that the revetments erected in 1830 are sufficient, and further that he cannot sanction the construction of revetments at Halifax of a less mean thickness than that used by Vauban, whose dimensions have now the advantage of long experience over any calculations that rests [sic] *in some degree on theoretical data.*[49]

Despite the uncertainty about the future, the working season progressed as efficiently in 1831 as it had the preceeding summer. In fact the department managed to spend £1,000 more in the course of 1831 than it had in 1830.[50] But it was clear by the end of the summer that some sort of settled policy on escarp sections was necessary before the work could progress much further. It was also clear that London was no longer disposed to listen to Nicolls, and it came as no surprise when he was transferred to Quebec.

Nicolls made one last gesture. On the plan accompanying the progress report dispatched on 3 September, he proposed a drastic alteration to the eastern front – the abandonment of the ravelin and the substitution of a redan. His explanation of the proposal was brief. It would, he said, afford greater interior space and improve external fire. It provided the ditch with flanking fire "as good or better than that done away with." Finally the cost would be about the same as that of the original proposal.[51]

London's reply was equally brief and requested plans and a detailed estimate.[52] It arrived on the same boat as Colonel Nicolls's successor.

9 "Elevation of Gorge of West Ravelin," 1832. The failed ravelin as it appeared to Colonel Boteler. (*Public Record Office, London.*)



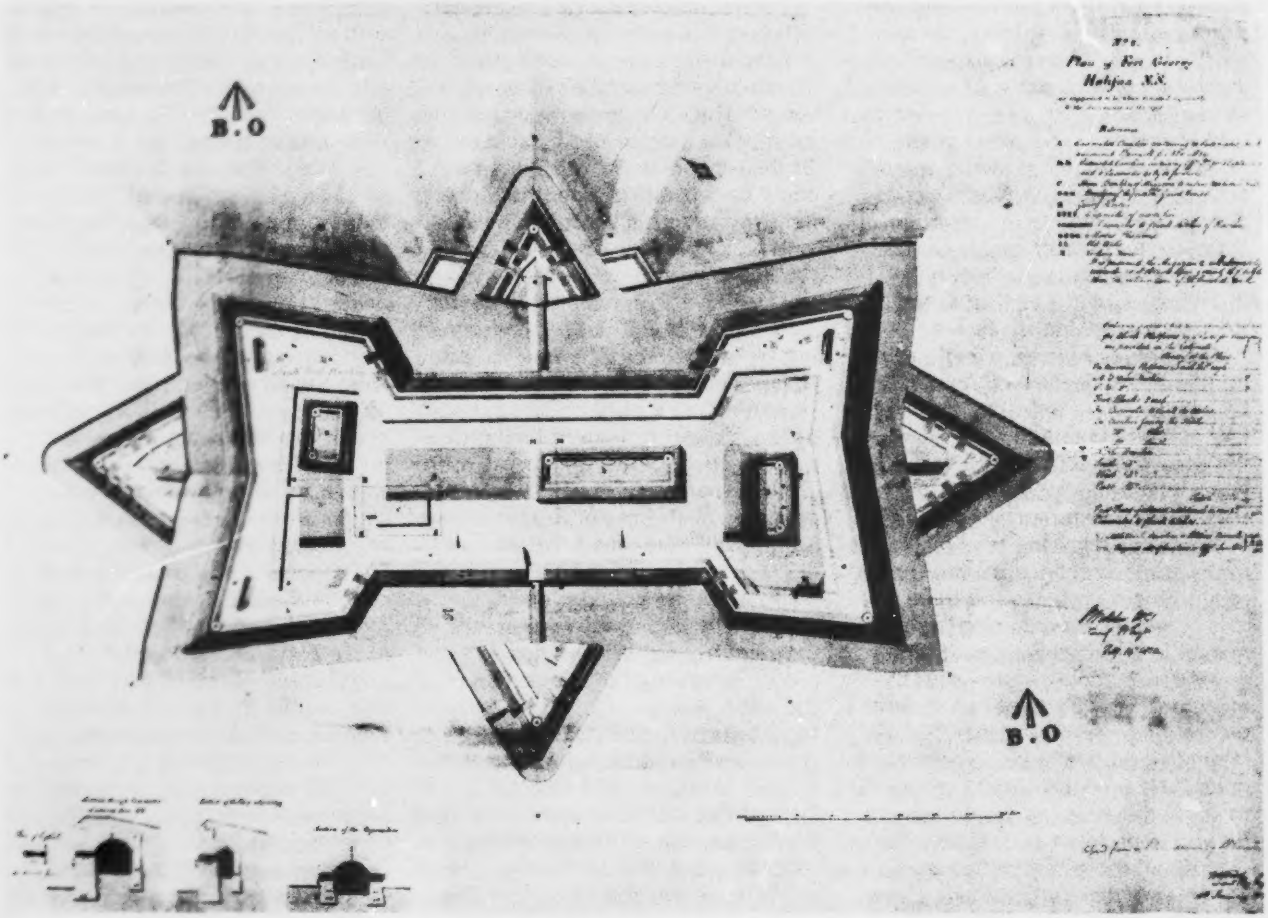
Truth and Consequences

I

Lieutenant Colonel Richard Boteler assumed Nicolls's command on 29 October 1831.[1] It must have been plain to him from the start that he had inherited a potentially dangerous and disturbing situation. We can, from his later letters, picture him in his first months on the station, picking his way around the rubble of the partly built Citadel, looking in dismay at the breaches in the newly built walls, at the new west ravelin, already twisted and misshapen,[2] at the old magazine, tottering on its island of mud in the middle of the partly excavated parade square. Boteler asked questions of his subordinates; there were few answers. Colonel Nicolls could tell him more, but the colonel was already in Quebec City, thankful, no doubt, that the mess in Halifax had passed into other hands.

Finally, in January 1832, the Fortifications department dispatched copies of Nicolls's original estimates and later correspondence to the new Commanding Royal Engineer, and informed him in a brief note that, with respect to the revetments, the Inspector General could not "sanction work of an inferior or insufficient description, nor a substance of masonry less than was used by Vauban." The department also asked for Boteler's opinion.[3] The controversy which was to swirl about Boteler and his successors had begun.

Boteler replied promptly, dispatching two letters and two expense statements to London on 14 February. The first of these letters, a summary of the state of affairs as he found them, was a long litany of woe and confusion.[4] The very shape of the fort was in question. Was Nicolls's plan for a redan on the east front to be adopted? Where were Nicolls's plans for drains for the place? Was it intended to retain the old magazine? If it was, he begged to inform General Pilkington that it held only 1,344 barrels of powder and was "now standing on ground 10-1/2 feet above the level of the interior of the fort." Was there any intention to provide barrack accommodation beyond that in the three cavaliers? If not, he suggested that


Plan of Fort George
Halifax N.S.
B.O
B.O

10 "Plan of Fort George," 1832. This is probably the best large-scale plan of the Citadel in its original form, and was drawn to accompany Colonel Boteler's letter of 14 February 1832. Appended to this version is a list detailing the state of the work in January 1833. *(Public Record Office, London.)*

the south Cavalier should be of the same dimensions as the north and that both should be constructed with a central corridor and a basement storey for servants. These buildings with the addition hereafter of another cavalier similar to that already built as a soldiers barracks, would contain accommodation for a regiment on the present scale.

As to the work already begun, he did not consider it advisable to continue with the west ravelin, since it was already twisted. He did not think that the gorge would bear being carried up to full height. He had similar reservations about the escarps; the one on the left face was already bulging. He noted that the sum included in the 1832 estimate for repairing the breach in the southwest bastion would only rebuild the right face, and there was no money for repairing the breach in the northwest bastion. In any event, he doubted the value of piecemeal repairs to the old work; as places were repaired, others might "not prove to be sufficiently good." He advised either waiting to see if the masonry would stand or tearing it all down and rebuilding.

With all these difficulties it was not an easy task to find work which *could* be undertaken. Boteler recommended continuing work on the counterscarp and gallery opposite the northwest bastion, despite the inconvenience of rubble spilling from the breach in the opposite escarp, since this was necessary in order to keep the masons busy.

Boteler enclosed a balance sheet detailing the amounts remaining unexpended of the parliamentary grants for the preceding three years.[5] The balance showed that most of the money had been spent. Of the remainder, however, some could only be spent after the problems raised in his letter had been satisfactorily resolved. This list of problems, with Boteler's comments, is worth examining in detail.

There was £2,277 6s. 9-1/2d. left from the 1829 estimate on the cavalier account. By Boteler's reckoning, all that remained to be done was to sod the roof, shingle the verandah and lay the lower floor. The cavalier was one of the few areas in which Boteler expected no problems. There was £188 0s. 3-3/4d. left from the 1829 estimate for four granite gun platforms. These belonged to the ramparts on the west front and could not be placed because of the condition of the walls. Another £145 11s. 0d. for the curbs at the salient angles could not be used for the same reason. The sum of £1,562 14s. 8-3/4d. left on the 1830 account for the casemates of reverse fire could be used, though Boteler doubted the wisdom of proceeding with the work. The £139 11s. 3d. for retaining walls, £40 0s. 8d. for curbs and £5 9s. 4-1/4d. for granite platforms, all for the west ravelin, could not be spent because of the danger of the ravelin collapsing. The remaining funds, mostly for excavation, could be used.

When Boteler's letter arrived in London, the engineer officers were astounded. Four cavaliers! Admission of the utter failure of previous work! An inadequate and improperly placed magazine! No plans for drainage! Whatever had happened? Who was to blame? Most important to all, what was all this going to do to the estimates? Would they have to go to Parliament again for money? The London staff had changed since 1828. Mann was dead; Wellington was leading the fight against the Reform Bill in the House of Lords. In their places were Sir Alexander Bryce and Sir James Kempt. It was Bryce who received the bad news first, and his immediate, instinctive reaction was to try to preserve economy.

Under all the circumstances, it will in my opinion be advisable that Lt Colonel Boteler be instructed to confine the operations at the commencement of the Working Season, to the Excavation, Counterscarp and Ravelin of the North Front, and that he should report how, in his opinion, the objects proposed in the original Estimate can be best attained without increasing the Expense already stated to Parliament.[6]

Bryce agreed with Boteler that it was unwise to undertake piecemeal repairs, and that it was necessary to wait and see how the work already completed would stand up over several winters. He suggested that casemating be substituted for cavalier construction. He had no firm opinions about Colonel Nicolls's proposed redan.

It was left to Kempt, in a pencilled marginal note on Bryce's letter, to assign blame for the situation and to speculate about the solution.

> *I am exceedingly pained* [?] *to observe, by Lt. Col Boteler* [sic] *Report, that the greater part, if not the whole of the Revetments of 1829 Erected under the direction of Colonel Nicolls must eventually be Rebuilt! – and I am pained* [?] *that an Officer of his Standing and Character in the Corps Should have Committed such Serious Errors as he must have done in the Plans & Estimates Submitted by him for the Citadel of Halifax – particularly in regard to the Strength and Solidity of the Several Revetments – This is the more unpardonable Seeing that Colonel Nicolls had Several years Experience of the Climate of N. America and ought to have been fully aware of the strength* [?] *of Masonry absolutely necessary to resist its Severity – indeed, I cannot but Consider what has occurred to be highly discreditable to the Department. –*
>
> *Nor Can I entirely acquit the Inspector General of Fortifications from all blame on this occasion, – for altho the Executive* [?] *Office is held responsible (and very properly so) for the Correction* [?] *of his Professional* [?] *Plans & Calculations, yet the Master General looks to the Inspector Gen^{l} of Fortifications for a Careful* [?] revision of all Such Papers – *in the Case of every Work Undertaken by the Department – and more especially When one of so Much Magnitude and importance as the Citadel of Halifax – requiring a great expenditure of the Public Money was in contemplation. . . .*
>
> *Seeing that the Revetments are imperfectly Constructed, it is a great object certainly to relieve them from the pressure of a Solid Rampart, and Casemating the North and South Fronts as proposed by Sir A. Bryce in lieu of the two detached Casemated Cavaliers will I have no doubt effect that object . . . but I can give no final decision on this Point until I see Lt. Colonel Boteler* [sic] *further Report.*
>
> *J* [ames] *K* [empt][7]

II

One wonders what Colonel Boteler thought as the winter of 1832 wore on. He had expressed his reservations about the Citadel project in strong language and had implicitly criticized his predecessor. What would London do? He got his answer in late May, and it was not reassuring. The Fortifications department, terrified by the prospect of asking Parliament for more money, demanded both results and economy – demands which Boteler knew perfectly well were inherently incompatible. He was to "complete the work in an efficient manner, without increasing the amount of the original estimate or diminishing the projected casemate accommodation, and preserving if possible the Revetments of 1830, and 1831, which appear not yet to have proved defective."[8] He was to report on Colonel Nicolls's proposed redan, which, Sir Alexander devoutly hoped, would "diminish the original Estimate of expense, and be a desirable alteration." The counterscarp gallery and mines on the east and south fronts were to be abandoned and the repair of the defective escarps was to be postponed until it was possible to find out whether they could be relied on. While Sir Alexander was "by no means disposed to sanction the hazard of a diminished revetment," he did wish, if possible, to "save those erected in 1830 and 1831," and Boteler was to do this, if necessary, by casemating. Finally the colonel was to report on the advisability of constructing "additional Magazine accommodation under the Ramparts in situations capable of thorough ventilation."

Fanshawe's private letter, which arrived with the same packet, was a little more explicit about some points. Sir Alexander, Fanshawe emphasized, was adamant about one thing: the revetments already built were to be preserved at all costs. Where it was impossible to relieve the pressure on the revetments by casemating, perhaps "additional buttresses, arches of discharge, or . . . dry walls in the rear" would serve as well. If it were absolutely necessary to rebuild failures, a special account of the sums expended was to be kept.[9]

The spirit of these two letters, with their enclosed comments from Bryce, was obvious. Boteler was being asked to work a miracle in order to preserve the department's honour. While we know that the Master General himself had agreed with Boteler's implicit criticism of Nicolls, no word of Kempt's approbation had seeped back to Halifax. Instead, the colonel got a curt injunction in Fanshawe's letter against making comments which might "excite controversial feelings." Boteler was to work wonders and he was not to rock the boat. After all, as Kempt's memorandum made clear, any criticism of Nicolls extended beyond him to the Inspector General's office itself, and Bryce had been Mann's deputy.

The Inspector General was sufficiently upset about Nicolls's performance to send him a copy of Boteler's letter of 14 February for comment. On 21 July Nicolls, writing from Quebec City, resolutely passed the buck back to the Ordnance.[10] While it was true, he admitted, that he had never framed an estimate for the drains, he *had* shown them on his plan. Access to the ravelins through the ditch was considered sufficient at other posts – Portsmouth, for example. While the barrack accommodation was insufficient for the garrison now proposed, it had been adequate for the number of men which Carmichael Smyth had originally required. As for the magazine, Nicolls wrote, "I believe there will be only a few spots outside Fort George from whence the ridge of the roof of this Magazine may be seen; when the parapets [?] are complete; on this account no provision is made for another." This last was the weakest point in Nicolls's case (should the ridge of a magazine roof be visible from *any* point outside a fort?) but on the whole the colonel acquitted himself well. Nicolls, always the devious, ingratiating politician, succeeded in drawing attention to the fact that his original design had been faithful to the intentions of his superiors and had been approved by them. After he scored this point, all attempts to assign blame for the Citadel debacle temporarily ceased.

Nicolls's counter-attack was not forwarded to Halifax until September,[11] but long before this Boteler had taken steps to protect himself in the event of the failure of his direct assault of 14 February. His position was, after all, unenviable. If he could not convince London that the situation was indeed serious and that expensive changes were necessary to complete the fortress properly, he would fail. His professional reputation was at stake. Shortly after he launched his direct assault, he changed to a different tack. The station records were sketchy: twelve plans, seven of them from before 1826,[12] and a few dozen letters. If London could not be made to see the gravity of the situation by direct means, perhaps a persistent series of inquiries on points of detail would serve. By the end of the year, the Ordnance had received more letters from Boteler on the subject of the Halifax Citadel than it had received from Nicolls in the preceding four years, and the flood showed no signs of cresting. In the end, Boteler achieved his purpose, but the deluge was to involve the Fortifications department in the intimate details of the Citadel's construction, and began a long series of transatlantic exchanges which was to hinder and occasionally paralyze Boteler's successors.

The first such consultation involved the counterscarp and gallery opposite the northwest bastion. As this was one of the few areas where Boteler felt that work could proceed, he wished to be able to start construction as soon as the weather allowed. There was, however, a problem. Nicolls's plans were vague. While the ditch deepened at the salient, the gallery behind the counterscarp was apparently intended to remain in the same plane throughout the entire length of the wall, with the result that the loopholes were 6 feet 3 inches above the ditch near the west ravelin and 9 feet 3 inches above it at the salient. Should he build the gallery in this fashion, or should he incline it so that the loopholes were all at the same height above the ditch?[13] A month later, Boteler reminded London of the problem, this time enclosing a copy of Nicolls's plan of the gallery and stating that the wall would be built according to plan if he did not receive instructions to the contrary.[14] London finally replied on 25 May.

Sir Alexander Bryce desires that the loopholes be so constructed that a person immediately under them, and *out of fire, may not be able to reach so as to throw grenades or other combustables into them – He therefore prefers the higher level of 9'3" . . . unless you find their construction at that height would leave too much dead ground immediately under them, in which case you are at liberty to adopt a lower level provided the ditch be sloped off or sunk so as to obviate the inconvenience before alluded to from grenades.*[15]

The Inspector General also suggested changes in the construction of the loopholes, and enclosed a sketch of the new arrangement.[16]

Fanshawe's letter did not arrive until the working season was well under way, and was therefore too late for its suggestions to be of practical value. Boteler, therefore, politely acknowledged its receipt and went on to say that he was proceeding along the lines indicated in his two earlier letters[17] – proof, if any were needed, that the whole object of the correspondence was not so much to elicit suggestions from London as to make his superiors aware of his difficulties. In fact, a new problem had arisen since his last letter. The salient of the counterscarp fell on "made ground" – ground which had been filled up to form the glacis – and in places the foundation of the gallery had to be "carried to a considerable depth, – in one part 12'6" below the bottom of the ditch." Boteler had met this difficulty by "building up the foundation . . . as far as the level of the bottom of the ditch," and proposed to erect the gallery, following the official plan, on top of this. The Fortifications department, apparently satisfied with Boteler's judgement, did not reply to his letter.

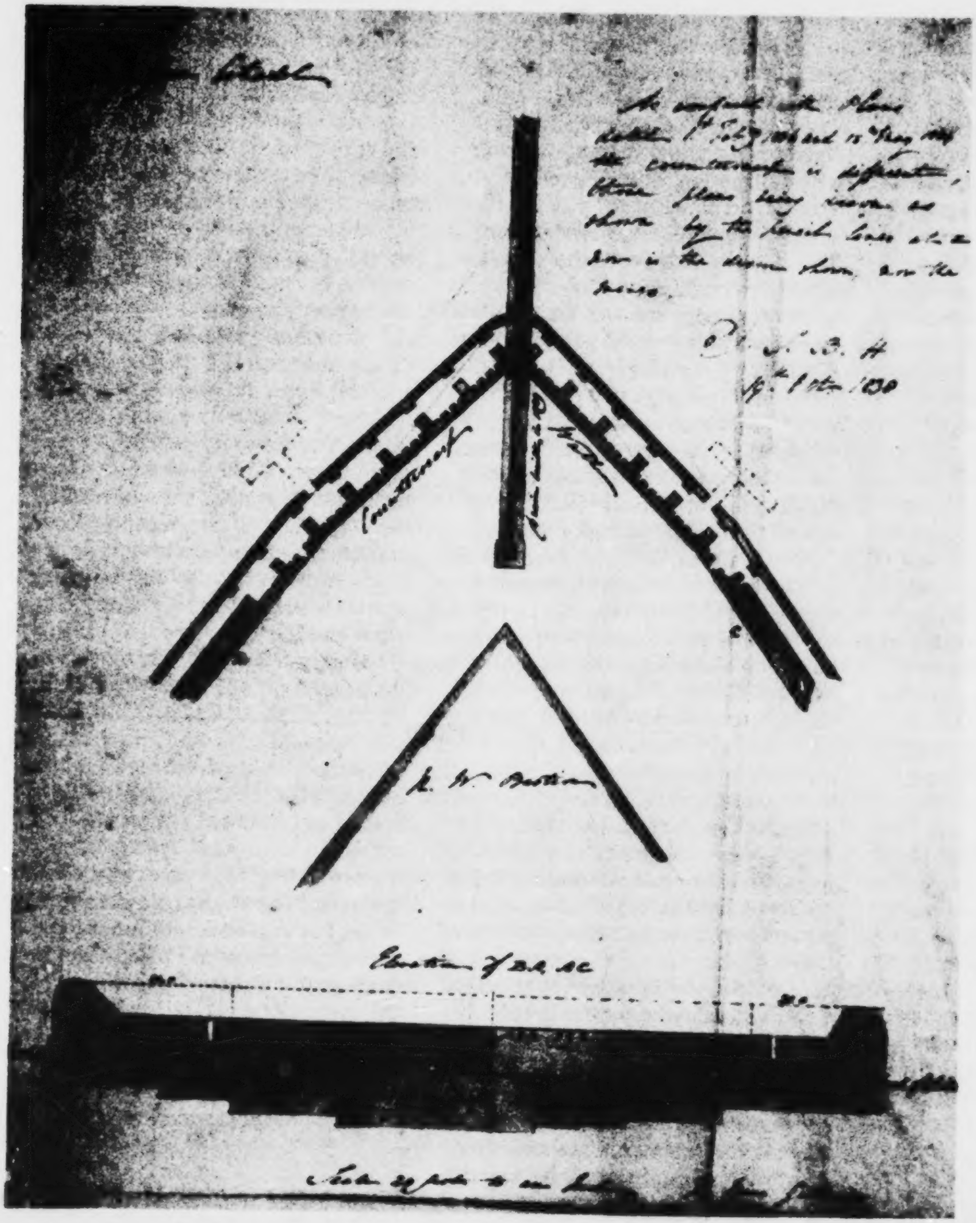
A month after his questions about the counterscarp and gallery, Boteler dispatched a long list of statements and questions about the north and south ravelins.[18] He noted that there was not enough money to complete the gorge of the north ravelin and that he had insufficient information to commence construction of the guardhouse and ditch in either. Was it Colonel Nicolls's intention to provide caponiers for these ravelins? Would it be possible to lower the escarps of both ravelins by two feet? London's reply took the form of four statements by the Inspector General in the margin of Boteler's letter.[19] The first three dealt with matters of detail. The escarps could be lowered, if this did not expose the revetments of the body of the fort to distant cannonade; the caponiers were superfluous and cost money; a sunken area was to be provided around the ravelin guardhouses. The fourth statement contained an important concession:

Lt. Col. Boteler is at liberty to offer any suggestions which his local information may suggest; – But in every proposition he may bring forward, Lt. Col. Boteler must distinctly state; with reference to the original estimate whether the new suggestions will produce an excess or saving, and to what amount.

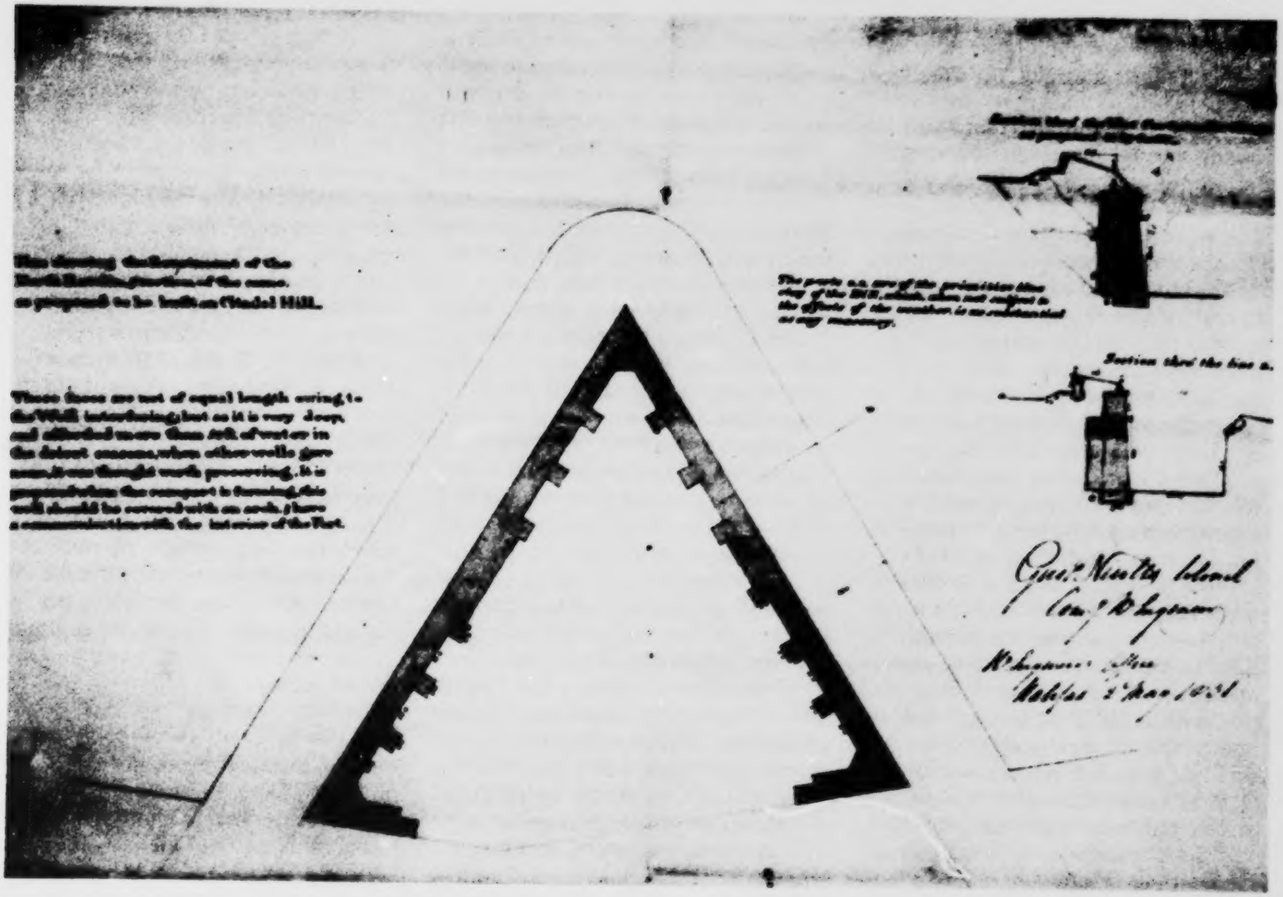
No longer was Boteler explicitly enjoined to preserve economy at all costs. The tide was beginning to turn in his favour.

As the summer of 1832 wore on, the results of Boteler's tactics began to be evident in the financial balance sheets. Ironically, the problem was not that Boteler was spending too much but that he was spending too little. As we have already seen, when Boteler took over his command there was over £3,000 unexpended on the Citadel accounts, some of it money which had been voted as early as 1829. London's response to this fact was an injunction to spend the money; as long as the total expenditure during 1832 did not exceed the cumulative grants up to that time (reckoned at about £71,000) both the Ordnance and the Treasury would be happy.[20] The Inspector General, earlier in 1832, had cut the annual grant by £3,409 17s. 2d. to £17,656 14s. 5-1/2d., but saw no need for any further reduction.[21] This gave Boteler a total of about £20,000 to spend. By the end of the working season, £3,000 remained unused.[22] The failures of the preceding four years had taken their toll. Too much of the work could not proceed without some sort of guidance on basic matters such as the shape of the fort and the means of remedying the failures, as well as specific information on lesser topics such as the height of the escarp and the arrangement of the loopholes. A coherent policy

11 Plan and elevation of the counterscarp and gallery opposite the northwest demi-bastion, 1838. This particular section of the counterscarp had been begun as far back as 1831 and was still in the course of construction. Difficulties encountered in its construction resulted in the change of design of the counterscarp and the abandonment of the casemates of reverse fire. The chief problem lay in the fact that counterscarp at this point was being built on made ground, ground which had been built up with earth excavated from the ditch. This meant that the foundations had to be excavated to an unusual depth and accounts for the 14-foot footing at the salient. *(Public Archives of Nova Scotia.)*



12 "Plan shewing the Revetment of the North Ravelin," 1831. The north ravelin was begun in 1831 and the escarps were carried up to the height of 20 feet by the end of the working season. No further work was done for at least seven years. It was not until the 1836 revised estimate was approved in the summer of 1838 that any funds were authorized for its completion. *(Public Archives of Canada.)*


Plan shewing the Revetment of the North Ravelin, & section of the same, as proposed to be built on Citadel Hill.
These faces are not of equal length owing to the Well interfering, but as it is very deep, and afforded more than 20ft. of water in the driest seasons, when other wells gave none, it was thought worth preserving. It is proposed when the rampart is forming, this well should be covered with an arch, & have a communication with the interior of the Fort.
The parts a.a. are of the primitive slate of the Hill, which when not subject to the effects of the weather is as substantial as any masonry.
Section thro' the line a.
Gust. Nicolls Colonel
Comg Rl Engineers
Rl Engineers Office
Halifax 2 May 1831

could be formed only in the light of detailed information which, it had become apparent, neither Boteler nor London possessed. A few plans, Nicolls's brief and insufficiently detailed estimates and a few dozen letters were all either side possessed, and these were not enough. The work was in a state which bordered on paralysis.

The major obstacle to the formation of a coherent policy was money. Boteler seems to have realized from the start that the deficiencies could not be made good and the work completed for the £116,000 allowed in the original grant. The problem was to convince London of this fundamental fact. Boteler's chance arose over Colonel Nicolls's proposed redan. On his arrival in Halifax, he had found a letter from the Inspector General asking for detailed information on the project.[23] Boteler provided it. Estimate, plan and covering letter were dispatched on 13 April 1832.[24] Having taken pains in his covering letter to state that he based his calculations on Colonel Nicolls's original estimate of 1825, Boteler reckoned that the additional expenditure for the alteration would be between £2,152 4s. 8-1/4d. and £3,254 11s 2-1/2d. He emphasized that the greater figure was for the construction of Nicolls's proposal in all respects. Even this sum only allowed for a 30-foot escarp at the redan salient, making it substantially lower than the salients of the two adjacent bastions.

London was quite properly shocked. "Sir Alex^{r} Bryce was not prepared from Col. Nicolls's letter . . . to expect any excess beyond the original estimate, even were his propositions to the full extent sanctioned."[25] Once again, the Inspector General demanded the impossible: Boteler was to remedy the low escarp at the salient, adopt the full extent of Nicolls's proposal, and stay within the original estimate.

The Inspector General's letter contained one significant change in tone. Earlier answers to Boteler's letters had called for reports on specific problems, but this letter was sufficiently vaguely worded to be taken as a request for a general report. In addition, Bryce's marginal annotation of Boteler's enquiries about the ravelin was delivered in the same packet. The two allowed Boteler the freedom to offer suggestions based on his knowledge of local conditions. London had finally given Boteler a loophole, and, in the autumn of 1832, he prepared to step neatly through it.

There is no evidence in the surviving correspondence that London ever requested anything so formal as a detailed estimate for the completion of the Citadel, but that was exactly what Boteler set about drawing up. In fact, he produced three of them, and, not content with transatlantic letters, decided to go to London to argue his case in person. He set out on the *Calypso* in late January 1833. He never reached London. The ship foundered and took Richard Boteler with it.[26]

Of all the engineers who supervised the building of the Halifax Citadel, Boteler had the most difficult task. It fell to him to retrieve Nicolls's mistakes and to force London to recognize the necessity of a thorough reassessment of the work. Had he lived, the transition from Nicolls's inadequate planning to the more detailed work which was necessary for the completion of the fort might possibly have gone smoothly. His death, coming when it did, was an unmitigated disaster. In the confusion which followed, the Board of Ordnance found itself saddled with no fewer than eight different detailed estimates for the completion of the Citadel, and an administrative stalemate set in which lasted for more than three years. In the end, the matter was settled as Boteler had intended, but by then the project had fallen hopelessly behind schedule, and limped on for another 22 years before finally being declared finished.

III

Finding a successor to Boteler proved to be no easy task. The new Inspector General, Major General Robert Pilkington, recommended Sir George Hoste.[27] Hoste, who had been a member of the Smyth commission, prudently declined.[28] The next candidate was Lieutenant Colonel Rice Jones, the Commanding Royal Engineer at Chatham, who accepted. By this time the Fortifications department was keenly aware of the disadvantages of sending out a new CRE without extensive prior consultations on the course to be followed once the CRE arrived at the station. But upon what could such consultations be based? The Inspector General's office had not yet seen Boteler's detailed plans; they had gone down with the *Calypso*. A request was dispatched to Halifax for copies, and Jones was instructed to remain in England until they arrived.[29]

When Boteler left for England, his command had temporarily passed into the hands of Captain Loyalty Peake. Peake had had no part in the formation of Boteler's estimates, but he was well enough acquainted with the situation to realize that Boteler's revised estimates exceeded the amount originally provided for the construction of the Citadel, and that London would probably not be pleased with them. After Boteler's death, Peake saw a golden opportunity arising. Rarely had a junior officer been in charge of so important a project. If he could suggest an economical solution to the problem, the Inspector General would be certain to notice him favourably. In any case, he had little to lose. The difficulties in finding a successor for Boteler and the decision to keep Jones in England until more information could be gotten from the colony gave Peake the time he needed, and he used it to draw up four estimates of his own. Between September 1832 and June 1833, therefore, no fewer than seven supplementary estimates for the completion of the Citadel were formulated.

Of Boteler's three estimates, the most elaborate incorporated all the changes proposed in the correspondence of the previous summer.[30] The new features incorporated in the estimate inclued the redan, two new magazines (each consisting of a pair of linked casemates in the western bastions) and 16 new casemates, the bulk of them in the north, west and south fronts. The southern and eastern counterscarps were to be built without galleries or mines. Granite was to be substituted for ironstone in the wall facings as "granite is very abundant in the neighbourhood of Halifax and of the very best quality."[31] The remaining items of the estimate were for the completion of other parts of the fort according to the original plan. The total expenditure was estimated at £92,378 5s. 8-1/2d.

Boteler's first estimate was, therefore, his assessment of the probable cost of implementing the suggestions made by London. These did not necessarily accord with his own views. He thought that "it would be better not to place [?] casemates under the ramparts of the north, south and west fronts," and he disliked the idea of abandoning the southern and eastern portions of the gallery and countermines and the south cavalier.[32] He therefore drew up a second estimate,[33] intended to supersede those items in the first estimate which dealt with the casemates and counterscarp, and to show the comparative costs of the two schemes. In the place of the casemates, this estimate proposed a "substantial retaining wall"[34] to take some of the loading weight off the escarps. The estimated cost was £79,014 2s. 10-1/2d., plus another £10,000 for the south cavalier.[35]

Boteler's third estimate[36] was intended to supplement either of the others. The bulk of it was concerned with the probable costs of making good earlier building, should it be necessary to do so. The amount of the estimate was £15,975 14s. 1d.

Peake's four estimates were arranged in a similar fashion; the first three presented alternative schemes for completing the fort while the fourth dealt with the cost of replacing earlier work. Peake's approach to the problem was, however, only superficially like Boteler's. Boteler had begun with the assumption that additional spending would be necessary in order to complete the work and drew up his estimates accordingly. He was not an innovator; indeed, as we have seen, he personally wished to retain the essential features of Nicolls's scheme and produced his second estimate to show that this could be done at a reasonable cost. Peake began with the opposite assumption: the Citadel *could* be completed for the amount specified in the original estimate if drastic alterations were made in the physical shape of the fortress. In proposing such alterations, he altered Nicolls's original concepts beyond recognition.

Peake was merely continuing a process which had begun with Nicolls himself. In Nicolls's original idea, the four fronts of the Citadel were reduced to a regular order by duplication on opposite fronts and by the uniform provision of auxiliary features like the counterscarp gallery and mines. Insofar as this arrangement was based on the idea of four fronts of more or less equal strength, it was a triumph of geometry over common sense. Nicolls's proposal to substitute a redan on the eastern front was a recognition of the fact that that front differed, both in its relationship to the adjacent ground and in its accessibility to any enemy from the other three. Peake carried this reasoning to its logical extreme. Each of the four fronts, he argued, was unique; each presented different problems to an attacking enemy and each had special advantages or disadvantages for the defenders. With this belief as his starting point, Peake produced a scheme in which no two fronts were at all alike.

He left the west front exactly as Nicolls had designed it. Most of the work had been done, if inadequately, and it would have been too expensive to make any radical changes. On the eastern front he accepted the idea of a redan, but considered the counterscarp and gallery unnecessary, suggesting the substitution of "a palisaded covert way" instead.[37] His argument for this proposal was that the nature of the ground and the close proximity of the town rendered it unnecessary to make this front as strong as the others. The north front he considered the most vulnerable because of

1st The nature of the ground towards the Country (See Colonel Nicolls plan of 26th December 1825).
2nd The small extent of the Front.
3rd The absence of Flanks.
4th The acuteness of the salient angles tending to shorten the parapet.
5th The position of the confined Ravelin which masks a great proportion of the direct fire, leaving not more than 70 feet of parapet fire upon each face.

To remedy these faults, Peake proposed that "A Caponnier . . . be added, and the Counterscarp with gallery and mines . . . be continued from the Salient (N.W.) until it meets the proposed covert way at the N.E. Salient." The south front was not, he thought, such a serious problem.

The South Front does not labour under all the disadvantages of the North Front and the Ravelin has not yet been commenced, any attack carried on against this side would be subject to annoyance both in flank and reverse from George's Island, and the Ground towards the country is less advantageous to an enemy than that to the northward, in fact this Front may be said to be refused to an attack as it almost faces the harbour.

He therefore proposed to complete the south front without a ravelin, but with a wide ditch, caponier, gallery and mines and a covert way; the last was to be an extension of the one proposed on the eastern front.

The core of Peake's scheme, therefore, was the use of caponiers. He listed six advantages to be gained from building them:

1st a sufficient Musketry fire will be obtained.
2nd Less of the interior space of Narrow Ravelins will be taken up than by the Bomb Proof Guardhouses.
3rd good and easy communication will be established between the body of the place and Ravelin . . . .
4th The Ravelin may be mined.
5th The Caponnieres will give additional Barrack accommodation for 20 men, making up a total of Barrack room for 700 men within the work . . . .
6th The platform of these Caponnieres may be made a little above or upon the same level with the superior talus, although they will be completely separated from the Body of the place, when together with the Cavalier already built, they may serve as defensible points to a late stage of the attack, and may greatly prolong the defence.

Above all, the caponiers had the advantage of being cheap. They provided the means by which some of the more expensive features of the original plans could be dispensed with, and "the several

Table 3. Approximate Amounts by which the various 1833 Estimates exceeded those of 1825 (for derivation of figures, *see* text)

	Boteler		Peake		
	No. 1	No. 2	No. 1	No. 2	No. 3
Expenditure to 12 June 1833	£ 55,718	£ 55,718	£ 55,718	£ 55,718	£ 55,718
Estimated cost of proposal	92,378	89,014	53,997	55,770	61,510
New estimated total cost	148,096	144,732	109,715	111,488	117,228
1825 estimate of total cost	116,000	116,000	116,000	116,000	116,000
Excess	+32,096	+28,732	−6,285	−4,512	+1,228
Estimated cost of replacing earlier work	15,975*	15,975*	7,242†	7,242†	7,242†
Total excess	+48,071	+44,707	+957	+2,730	+8,470

*Boteler No. 3.
†Peake No. 4.

Fronts completed at a moderate expense and their capabilities of defence nearly equalized."

Peake estimated the additional money needed to complete his basic scheme at £53,997 12s. 10-1/4d.[38] He produced, in addition, two variations on it, the first dispensing with the north and south caponiers and reinstating the south ravelin,[39] the second encompassing both ravelin and caponiers.[40] The cost of the first variant was put at £55,770 9s. 1/4d., and that of the second at £61,510 10s. 11-1/4d. Peake's fourth estimate, for tearing down and rebuilding escarps in the southwest and northwest bastions, amounted to £7,242 8s. 9-3/4d.[41]

We now come to the difficult problem of trying to ascertain the amounts by which the various schemes of Peake and Boteler would have exceeded the original estimate. If any contemporary calculation was done, no trace of it has been found, and the contemporary material which survives concerning Citadel expenditure before 1836 is frequently contradictory. The overall cost was to be computed by adding the estimated total of the new project to the amount of money already spent under the original grant. The problem lies in determining the latter figure. According to Peake, £55,718 had been expended as of 30 April 1833.[42] The surviving Citadel account book, however, states that no less than £86,570 had been *granted* by the end of 1833.[43] How does one account for the discrepancy? Had the unexpended balance on the Citadel account increased from £13,000 to £30,000 in less than a year? Were the figures in the account book – which was only begun after 1836 – wildly inaccurate? Or did Captain Peake manipulate his calculations to produce the lowest possible figure? Given the information presently available, it is impossible to tell which explanation is correct, but the last one is the most likely. The date Peake chose for his calculations – 30 April – was significant, since it fell before the beginning of the 1833 working season. By the time he wrote his letter of 12 June, several thousand pounds more would have been spent. The calculations which follow are, therefore, based on the *minimum* cumulative expenditure under the 1825 estimate; the total amount needed in excess of the estimate may have been anywhere up to £30,000 more.

The accompanying table (Table 3) details the calculation of the excess or saving produced by both Boteler's and Peake's schemes. In the case of each of the five basic schemes, the total amount of the new estimate is added to the £55,718 which, according to Peake, had been spent on the Citadel to 30 April 1833; the sum of these two figures is the estimated total cost for each scheme. This total is then compared to the original estimated cost (£116,000, in round figures) and the excess or saving calculated. To this is added the amount estimated for rebuilding old work; the total of the two is the total excess. The difference between the largest and smallest total excesses is more than £54,000. The least expensive is Peake's basic scheme (Peake's estimate No. 1) which represents a saving of £6,285 over the 1825 estimate. The most expensive is Boteler's first scheme, coupled with his estimate for rebuilding, which represents an excess of £48,071. On paper, at least, the range of alternatives was comprehensive.

On 12 June 1833 Captain Peake bundled up the whole lot – seven estimates, a covering letter, two explanatory letters, reports by Captains Wentworth and Rivers, and a list of plans – and sent the entire collection off to London.[44] Altogether, it amounted to more than 400 folio pages. One can almost hear the gasps of alarm when this monstrous collection was trundled into the Fortifications department. Pages and pages of figures, enough to keep the clerks busy for a month; the very complexity of Peake's report was its downfall. Colonel Jones was presently to be sent out to the station. He could read all these documents, of course, but only as a means of increasing his knowledge of the situation. He must produce his own report – simple, coherent and (subject to London's approval) final. As for the fruits of Peake's and Boteler's labours, they were put aside and forgotten until further alterations were proposed ten years later.

Imbroglios

I

Winter was usually the slack season for the engineering staff in Halifax. The working season was over. The annual estimates were usually completed before Christmas. There was little to do, except for the administrative work necessary for the next working season which began, weather permitting, around the first of May. In the early 1830s, however, the winters were anything but normal. Christmas of 1833 found the entire establishment – clerks, junior officers and draughtsmen – labouring over yet another revised estimate for the Citadel, the eighth in less than two years. By this time the work had become almost routine. The calculations had been done many times before; many of the necessary drawings were copied from ones made earlier for Boteler and Peake. Even the order of the individual items was well-established. Any novelty the work might have provided had long since vanished; all that was left was simple hard slogging.

The new estimate, therefore, had something of an air of *déjà vu* about it. Colonel Jones, who was ultimately responsible for its formulation, fundamentally agreed with Boteler; the work had to be completed along the lines originally laid down by Nicolls without making sacrifices of strength or durability. He recognized that this would entail spending more money than had originally been intended, and faced this problem head-on in the opening paragraph of his explanatory letter:

I have the honor to transmit the accompanying plan, and explanatory Sections, showing the manner in which I consider the Work can best be completed, together with an Estimate of the Expense, V^t. £99,833 . . 2^s . . 1 1/4^d, which I regret cannot be brought nearly down to the Amount of the Original Estimate, without seriously compromising the Defensive efficiency and General Protection which by the Original Instructions to Colonel Nicolls, the Citadel at Halifax was intended to afford. . . .

The enclosed Estimate . . . has been framed upon the lowest and most economical Scale, and I know not how it can be reduced.[1]

Anticipating critical comparison of his own estimates with Peake's, Jones went on to reject the latter's proposals:

I cannot concur . . . concerning that it [Peake's proposal to eliminate the eastern counterscarp] *would actually impare the defensive value of the Citadel, and also materially lessen its estimation in Public opinion, a point of some consideration in erecting a Work for the protection of a Town.*

He concluded his introductory remarks with an acknowledgement of the paternity of his proposals: "I have adhered as closely as practicable to the original Project, and that of L^t Colonel Boteler for its completion."

The estimate encompassed the completion of the three ravelins as envisaged by the original plan. Accepting Boteler's and Peake's arguments for caponiers, Jones provided for three of them, one for each ravelin. The eastern front was to be closed with a redan which was to extend "34 feet less than Colonel Nicolls intended but 16 feet further than proposed by Lt. Col. Boteler." The counterscarp was to be built with piers and arches instead of the continuous-arch gallery originally proposed, since this would result in substantial savings. For the same reason, Jones proposed to dispense with the countermines. In an emergency they could "be readily branched out . . . in the requisite direction through the openings to be left in the Walls of the Gallery at proper intervals." Any savings from these two proposals would, however, be more than swallowed up by the necessity of thickening the escarps "nearly one half more than originally proposed." As for the earlier failures, Jones wrote:

I coincide with Captain Peake in opinion, that the Masonry built in 1829 must all be taken down and rebuilt to sustain the weight of a Rampart. – But I think it not improbable that the portions of the West Curtain and the Flanks recommended by L^t Col. Boteler to be rebuilt may give way no further, and I should recommend their remaining untouched.

The only really novel feature of Jones's proposals was the emphasis he placed on casemates. He provided for no fewer than 27 new ones, mostly on the north and east. His most striking innovation was his proposal to casemate the redan as officers' quarters. He had no doubts that the problems associated with casemates could be successfully overcome.

With due precaution and by adopting the expedients successfully tried at other places, I have little doubt of being enabled to render the Casemates sufficiently dry and in other respects fit for the accommodation of Officers.

The provision of additional casemating rendered the cavaliers superfluous, and Jones eliminated the northern and southern ones from the estimate. The western cavalier, on the other hand, was already largely built. Jones proposed to complete it as a barracks for 320 soldiers. He also proposed the addition of a casemate at each end of it "to give the additional support it plainly appears to require before it can be safely loaded with its Terreplein, or guns mounted on it."

The other major problem in the interior arrangement of the fort was, of course, the magazine. Jones borrowed Boteler's proposal for two new magazines, each consisting of a pair of casemates to be buried in each of the western bastions.

II

With the arrival of Jones's estimate in London, the Fortifications department finally had a coherent scheme to work with. Unlike the previous plans, this one had been anticipated, and almost immediately it began its slow progress through the proper bureaucratic channels. The Inspector General was dismayed but no longer horrified at the prospect of exceeding the original estimate. He recognized the fact that an excess was inevitable. The whole approach to the new scheme reflected a desire to investigate its component parts thoroughly and to insure that, once adopted, it could be implemented without further embarrassment. A copy of the new report was sent to the Master General and board as soon as it arrived in England. On 15 May the Board of Ordnance issued orders for the official submission of the estimate for its consideration.[2]

The key document in the official submission was the Inspector General's detailed commentary on the estimate, and this was dispatched on 4 June.[3] For the most part Pilkington was disposed to agree with Jones's suggestions, although he had specific changes to recommend in some of the items; for example, a different manner of construction for the redan casemates and changes in the arches of the two new cavalier casemates. He disapproved of the sunken casemated magazines "because there is so much difficulty in affording them sufficient ventilation" and recommended that they be "left open" (that is, not covered by the ramparts). He thought that the retention of the gallery through the whole of the counterscarp rendered all three caponiers superfluous. He passed over the financial question without comment, merely noting that the estimate required "£48,512 beyond what Parliament have been told to expect for the whole."

Pilkington was not entirely satisfied with the estimate:

I have already stated that the Report of the Estimate is not sufficiently explicit and full to admit of its minute examination, many points of Specification are deficient and it will be seen that some parts are provisional. – This I think unnecessary in the present case, the intentions of the comm^g Engineer should be definite, founded on the experience which this work has already afforded, and I therefore propose returning the Estimate to L^t Col^l Jones for revision so soon as I am favored with the Master General's decision on the Project.

The Master General's decision arrived within the month.[4] The Ordnance clerks differed with those in the Inspector General's office about the amount of the excess occasioned by the new estimate; they put the figure at £62,000. Except for this detail, the Master General found the estimate satisfactory. But there was a major reservation. As a result of the excess, it would be necessary

to put the government in full possession of the circumstances which have occasioned this great excess and to obtain the approbation of the Lords Commissioners of the Treasury . . . before any further steps can be taken on the subject.

A detailed examination of the Ordnance accounts had produced the figures for the amounts already spent on the Citadel, but this was insufficient. The Inspector General was, therefore, to

draw up a detailed Statement to *shew how this great excess has been occasioned* [emphasis Byham's] *– whether from inaccuracy in preparing the original Estimate, – or from the defective manner in which the Escarps were built by Colonel Nicolls, – or from the alterations that have been made, and are projected.*

The statement was to be prepared as soon as possible so that "the subject may be brought under the consideration of the Government."

Colonel Ellicombe replied to this missive two weeks later.[5] The Ordnance office and the Inspector General's office were still at cross purposes about the amount of the excess, for Ellicombe still calculated it at £48,512. Of this, £17,313 (Ellicombe explained) was for new services not provided for in the original plan – the north and south caponiers, for example, and the magazines, redan, casemates and so forth. Another £18,821 was the result of "deficiencies in the original estimate" including the drains, the increased size of the revetments and the necessary rebuilding. The remaining £12,178 was the result of increasing the garrison from 320 men and 12 officers to 644 men and 19 officers. He concluded,

The excess on the original Estimate is to be very much regretted, but with the exception of £6143 for a New Magazine, and the expense of the Caponieres £1928 . . 14 . . 7-1/4, which might probably be ultimately found unnecessary . . . the whole appears unavoidable and shows that the original Estimate was much too low . . . .

I would however . . . calculate on the necessity of providing for the whole of the additional Amount . . . as the expense of this important Work.

Ellicombe's letter demonstrated that the Inspector General's office, at any rate, was completely convinced of the necessity of getting additional funds. But the matter had passed entirely out of his hands. The Inspector General was powerless to make major financial decisions, or even to approach the Treasury directly for support. This was the prerogative of the Master General and board. These gentlemen were, by now, thoroughly aroused. The board could hardly be expected to decide about such a vital matter without first conducting an investigation of their own and, with this decision, the first phase of the bureaucratic process came to an end.

III

The new phase opened with an "*Immediate*" board order on 3 November.[6] The Clerk of the Ordnance had finally agreed with the Inspector General's Office that the new estimate would probably exceed the old by £48,512. Part of the problem had been that the amount of the excess could be calculated only if the exact amount already granted for the Citadel were known and, while there was no difficulty in ascertaining this figure, there *was* some disagreement about the amount which had actually been spent. Specifically, there was an unexplained difference of £7,659 between the amount which the London office calculated had been spent by 31 March 1834 and the amount which the Halifax office calculated had been spent as of 31 December 1833. A statement was appended showing the amounts calculated in London,[7] and the officers in Halifax were to comment on the differences.

At the same time, the Clerk of the Ordnance had drawn up an extremely detailed account of the expenses which had been incurred in the construction. This detailed every last penny spent from 31 October 1828 to 22 March 1834 and took up 26 pages of close handwriting.[8] The Respective Officers were instructed to compare this with the accounts in Halifax so "a perfect uniformity may exist between the accounts."

Halifax responded to this request with surprising speed. Statements from the Respective Officers, dated 29 December, were dispatched by Colonel Jones on 14 January 1835.[9] The Respective Officers found that the detailed accounts were correct in most particulars. A few of the vouchers had been recorded inaccurately, but these all involved small amounts and were apparently due to clerical error.[10]

The difference between the calculations of actual expenditure required a more complicated explanation. It was mainly due to two factors. The expenditure had always been divided between sums spent in the colony and sums allowed for stores sent from England. The accounts for the latter were inconsistent because the Ordnance office charged the full amount for good sent, while Halifax only invoiced the value of goods received. As of 31 December 1833, £7,399 had been charged in London as opposed to £3,242 invoiced in the colony. The difference was largely the result of goods being damaged en route or not received at all and included the sum of £422 for 20,700 large bricks "thrown overboard on their way to Halifax" in 1830.[11] The other discrepancy was in the amount paid to the Royal Staff Corps charged against the Citadel account. London had charged £10,216 while Halifax had charged only £7,404.[12] The sum of the differences between these two sets of figures, plus the £1,169 spent between 1 January and 1 March 1834, added £8,138 to the Halifax calculations of overall expenditure. This narrowed the difference between the Halifax and London accounts to £479 (the Halifax calculations were now the higher of the two) and the Respective Officers were at a loss to explain this discrepancy.[13]

But they did not leave matters at that, and after three months' digging, finally unearthed the source of the trouble – two vouchers which had not been properly recorded and cumulative errors in the detailed accounts amounting to £1,478 3s. 0d. This brought the discrepancy down to 17s., where everyone was content to leave it.[14] Whatever its other failings might have been, the Ordnance department in Halifax had demonstrated that it could keep books.

On 17 July the Clerk of the Ordnance pronounced himself satisfied with the accounts.[15] The gentlemen of His Majesty's Honourable

Board of Ordnance then paused to scratch their heads. If the accounts were in order, then what could be wrong? "[Is] it possible," the Master General inquired on 19 August, "in any way to revise and modify the estimate so as to reduce it nearer that originally proposed and that without weakening the defences?"[16]

The new Inspector General, Sir Frederick Mulcaster, replied a week later.[17] He noted that, before 1825, over £300,000 had been spent on temporary works on Citadel Hill, all of which had rapidly vanished. The present fort, by comparison, would be permanent and, even with the revised estimate, would cost far less than its predecessors. He could suggest minor alterations in Jones's plan – the abandonment of the caponiers, for example – but none which would result in a drastic reduction in the cost of the work. He concluded,

Upon the whole therefore I am of the opinion that a great part of the additional expense of £48,512 now contemplated, is unavoidable if the permanent Work is to proceed to a state of defence. I concur in M General Pilkington's report of 4th June 1834 which has been approved by Sir J. Kempt [18] *and if the present Master General is of the same opinion as to the eligibility of Lt Coll Jones' Project as modified by the Inspector General, there appears to me no other mode to pursue but to call for a revision of the Estimate as proposed, and the whole subject will then be in a state to lay before His Majesty's Government.*

This judicious nudge finally got results. Mulcaster was to instruct Colonel Jones directly to produce a revision of his estimate, and the Master General promised in the interim to notify the Treasury to apprise "their Lordships that a sum of about £49,396 . . . will be required in excess of the original Estimate."[19] The instructions to Jones had barely left England[20] when the Treasury, having been informed of the case, reacted violently. Their lordships flatly refused to sanction any additional funds beyond those already approved, and demanded that the officer responsible for the original estimate be called to account.[21] The third phase of the bureaucratic process had begun.

IV

By this time the process had begun to display a pattern. As each government department became involved with the situation, it attempted to deal with it in such a way as to minimize the impact of the problem on its own day-to-day existence. The Fortifications office had attempted to ignore the situation; the Board of Ordnance had tried to take refuge in its own account books; the Treasury attempted to choke off the demand for money. These initial negative reactions invariably provoked an aggressive response from the agency which had raised the issue. In this way the Commanding Royal Engineers, faced with the Fortifications office's disbelief, consistently applied pressure; their aim was to force the Inspector General to take effective measures to deal with the situation. But once the process got above the level of the Inspector General's office, it became more complicated. Once the Board of Ordnance was involved, the Fortifications office became a sort of broker between the Commanding Royal Engineers and the board, and the function of the CREs became to supply the Fortifications department with sufficient information to force the board to act. When the Treasury got involved, the honourable gentlemen of the board became the brokers and the Inspector General's office took over the business of supplying enough ammunition to enable the board to press the issue to a successful conclusion.

This stage of the process began even before the Treasury's reaction was known. Recognizing that the Citadel project was only one of a multitude of matters under consideration by the Master General and board, and a relatively minor one at that, the Inspector General's office prepared a memorandum detailing the circumstances of Colonel Jones's estimate.[22] This was accompanied by a precis of all major correspondence on the subject between 1828 and 1835.[23] These two documents contained a distillation of the Inspector General's case, and, since both Master General and board depended for information and advice on the Fortifications office, it was inevitable that the honourable gentlemen would present that case to the Treasury.

Having secured its flank with the Board of Ordnance, the Fortifications department could only hope that Colonel Jones would provide the necessary revised estimate as soon as possible. He did so on 2 February 1836.[24] The covering letter was brief. Jones had accepted all the major changes proposed in London and incorporated them in his estimate. The caponiers were omitted; the redan counterscarps were raised to 20 feet at the salient; the magazines were redesigned as single-arch buildings, each enclosed by an area wall, and three casemates were added on the north front. The saving amounted to only £957 4s. 2-1/2d.

There is no record surviving of the submission of the revised estimate to the board. It must have been done almost as soon as the documents arrived in England, because when the estimate was returned to Jones for further revision on 17 July the comments of Mr. Cram, the Surveyor of the Ordnance, were enclosed.[25] Numbers of minor revisions were requested. The Inspector General was of the opinion that the buttresses to the magazines could be dispensed with and that the main drain should have a concave floor. He also requested more details about the gate and bridge and some additionl information about missing dimensions and so forth. Mr. Cram was more critical, but his criticism was almost entirely directed toward specific instances of insufficient detail in the estimate.

Jones made all the required corrections, and, for the third time, sent the estimate to England. By then it was December. The estimate was well on its way to its third anniversary, and progress toward its final acceptance seemed minimal.

V

While Jones was revising his estimate for the second time, he was also conducting a running battle on a second front with Colonel Nicolls in Quebec City. This, of course, was the result of the Treasury's insistence that the perpetrator of the original estimate be called to account. As Jones knew more about the project than anyone else, the burden of the dispute fell on him. One suspects, moreover, that the Fortifications department preferred it that way; it gave the whole affair the appearance of a squabble between two relatively junior officers and deflected blame from the Inspector General's own staff.

Nicolls, predictably, defended himself and attacked Jones. Now that London had decided that mistakes had indeed been made, the Inspector General no longer felt it necssary to demand of Jones, as he had of Boteler, that the Commanding Royal Engineer in Halifax refrain from exciting controversy. Jones was permitted to reply to Nicolls's comments and by early 1836, the Nicolls-London-Jones correspondence had developed into quite a considerable side-show.

Nicolls fired his first broadside on 23 November 1835. In a letter addressed to Jones, but worded with the copy for London in mind, the colonel defended himself.

> *I do not entertain the smallest doubt . . . I should have satisfactorily completed the whole as estimated in 1825, with the additional thicknesses, and moving the Buttresses nearer, as done in 1831, and these opinions are supported by the savings made on the Casemated Cavalier built in 1830–31, . . .* [and] *on the Casemates under the Ramparts . . . of which 10 were built, and 2 far advanced on the £5404 granted for building.*[26]

Without more information, he could not be specific about the reasons for the additional expense, but he suspected that alterations in the type and quality of materials and changes in the labour situation might have been to blame. He also thought that

> *Much additional expense . . . has also arisen from the execution of the Work passing from the first Projector* [i.e. himself] *. . . through 3 different hands . . . whose ideas it is not to be expected would exactly correspond, and even supposing them to be better than those of the Projector, would cause additional expense, of which procrastination itself is a great source.*

He concluded with a request for more information.

Nicolls next addressed himself directly to the Inspector General, sending a detailed commentary on the 1834 estimate.[27] He had many complaints. He had not resigned himself to the destruction of the old magazine but, if this had to be done, he held that the replacement should be built on the same site.

He considered the north and south caponiers useless and detailed his objections to them. He thought that casemated accommodation would be unwise "in so moist and variable a climate as Nova Scotia." He believed the additional casemates at the ends of the cavalier to be unnecessary for the reasons Jones had advanced – that is, to give the building much-needed additional support – and he disagreed with the proposed height of the redan escarp. As for the provision of additional barrack space, he was of the opinion that there had been enough accommodation allowed for in the original design, even for the expanded garrison which was now considered necessary.

Shortly after Nicolls's letter was dispatched, Jones's detailed account of work performed after Nicolls left Halifax arrived at Quebec.[28] This precipitated the most complicated exchange of all. On 13 January 1836, Nicolls dispatched two detailed commentaries on Jones's memorandum and a letter to the Inspector General, defending himself and his original scheme.[29] The commentaries were promptly sent off to Halifax, and Jones lost no time in composing two statements of his own.[30] In this way the scope of the controversy was limited to a fairly narrow area, the state of the work in 1831–35 and the merits of the methods adopted by Boteler, Peake and Jones himself during that period. But even this limited range was sufficient to provoke the single most thorough discussion of the work to appear during the entire history of its construction.

Nicolls's letter to Mulcaster is the least interesting of the several documents involved in the exchange. In it he merely amplified the arguments he had used in his earlier letter to Jones, blaming the excessive spending on alterations in the work, the provision of additional accommodation, the extensive use of granite and the frequent changes of Commanding Royal Engineer since his departure. He still maintained that he could have completed the Citadel for the amount of the original estimate, and he contended that the £29,066 spent between 1832 and 1835 had, perhaps, been badly expended; "[It] seems very large for the services performed during these four years." This last was the heart of his defence. It was not that he, Nicolls, had been negligent, but that his successors had been inefficient.

Jones's memorandum of 16 December detailed the difficulties which had arisen since 1831. He noted that almost no escarp wall had been completed after that date, mostly because no agreement could be reached on the dimensions of the new escarps. He detailed the troubles which had unexpectedly developed when it was discovered that the foundations of parts of the counterscarp had to be sunk far below the levels originally intended in order to secure a solid footing. The excavations had proceeded slowly because the engineers had not been able to form the ramparts which would absorb the earth from the excavations. He noted in passing that calculations had shown that the total amount of earth to be excavated was insufficient to form both the ramparts and the glacis, and that as a consequence, some earth would have to be hauled from elsewhere. He dealt briefly with Nicolls's charges that he and his predecessors had adopted more expensive methods.

> *On examination, the difference of prices between the two Estimates, appear* [sic] *very immaterial.*
>
> *With regard to the quality of the Materials, the only difference is that a greater portion of Granite has been used than was at first contemplated . . . but it is not considered more expensive than the iron Stone for faced Work. –*
>
> *The original Estimate was framed under the Idea of the Workmanship being performed three fourths by Civil Artificers and one fourth Military, and the labour altogether by the Military. – The Workmanship of the present Estimate is calculated at the same rate, but for the labour only one third Military, and two thirds Civil, from the difficulty experienced in getting regular Military assistance.*[31]

Jones concluded by listing no fewer than 14 reasons for the differences between the estimates, the bulk of them resulting from additions to and corrections of the original project.

It would be futile to detail or even to attempt to summarize the exchange between Jones and Nicolls which erupted over this memorandum. The points in dispute were essentially technical. ("Should Col. Boteler have sunk the foundations for the counterscarp opposite the North West section to a depth of over 12 feet?" Colonel Nicolls asked. "Yes," answered Colonel Jones. "And in his place I would have done the same.") Essentially Nicolls was trying to prove by example what he had charged in his letter of 13 January to Mulcaster – namely, that his successors had been inefficient and wasteful – and in so doing he made a grave tactical error. As long as he confined his defence to demonstrating that his original conception had satisfied all the requirements of his superiors and answered all questions with general replies, he was relatively safe. Instead, he chose to claim that he alone could have completed the Citadel, and the claim would not stand detailed scrutiny. Jones's replies were reasonable and satisfactory and Nicolls's criticisms were more or less wholly refuted. He never again was consulted on the subject of the Citadel.

At this point Colonel Nicolls departs from the history of the Citadel. As far as can be seen the debacle did not have any adverse effect on his career. His promotions arrived on the expected dates: major general in 1837, lieutenant general in 1846, colonel commandant of the Royal Engineers in 1851, and finally full general in 1854. He died at Southampton on 8 September 1860,[32] four years after the major project of his career had been finally completed, 20 years behind schedule.

VI

The absence of an accepted overall plan played havoc with the annual estimates for the Citadel. In Halifax, Jones had no choice but to continue bringing forward Citadel items in each annual estimate, although, without a final decision about the eventual fate of the work, it was becoming more and more difficult to find "safe" projects to spend money on. Perhaps he hoped by attempting to keep expenditures at near-normal levels to remind London of the need for haste.

London, however, could not be hurried. It responded to the problem in an equivocal fashion; it continued to allow grants with each annual estimate – possibly to allay suspicions in Parliament that something was wrong – but insisted that Jones spend only the money granted *before* 1834. Therefore, when Jones asked for £11,143 10s. 8-3/4d. for the Citadel in the annual estimate for 1835[33] Mulcaster reduced it to £3,000 on the grounds that the previous balances had not been expended.[34] When Jones asked whether this amount would also be frozen,[35] he was informed that the rule on expenditure still stood.[36]

A month later, the decision of the Treasury to limit expenditure under the old estimate[37] made the situation even more difficult. The sum of £2,000 was granted on the annual estimate for 1836 and it too was frozen.[38] The situation in Halifax was becoming desperate. At the beginning of the 1836 working season, the unexpended balance on the grants for 1828-33 had stood at £2,880[39] and was declining rapidly. By August the total had fallen to £700 and Jones warned London that, unless more funds were forthcoming, all work would stop on 30 September.[40]

At this, London was finally forced to relent. Ellicombe recommended that "the Commanding Engineer . . . be authorized to charge the vouchers . . . to the votes referred to [i.e., 1834–36] as soon as the money on previous votes shall be wholly expended" and to "proceed with such parts of the work on which no alterations is [*sic*] contemplated."[41] The board agreed and issued the appropriate orders on 30 September[42] – the day the money ran out.[43]

Even this was only a temporary relief. When Jones included £5,814 13s. 8d. for the Citadel into the 1837 estimate,[44] London deleted it altogether,[45] completely drying up the Citadel funds. At that point there was a total of £16,008 left in unexpended balances.[46] Normally this would have been spent in a single season, but conditions were by no means normal. To all practical intents and purposes the works were paralyzed by the absence of a coherent policy. As a result in the period from 1833 to 1837, little was spent and less was done.

By the summer of 1838 it was abundantly clear where the bottleneck was. The Treasury showed no inclination to hurry. Worse, the board had more or less abandoned the struggle, leaving Mulcaster to fight on as best he could. On 6 July he once again submitted the revised estimate to the board for transmission to the Treasury, along with related documents including the correspondence with Colonel Nicolls and Jones's commentary thereon.[47] He noted that the estimate had been revised

with reference to . . . the Reports of my Predecessor and myself . . . both at the Station, and, (so far as it has been practicable to do so from the information afforded) in my Office –

He admitted that there were still some minor omissions, but hoped that these would be covered by the one-tenth contigency provision (a provision by which one-tenth of the total amount estimated for was added to the total as a margin of safety). The final amount of the estimate was set "in round numbers [at] £102,500, which will be about £51,000 beyond the [present estimate]" and he recommended its acceptance.

On the same day, the board slid a discreet knife into Mulcaster's back. The Surveyor of the Ordnance drew up his own assessment of Jones's work, and he was far more critical than Mulcaster. He wrote,

I am induced [?] *to consider that the present estimate could not be looked upon as a complete Document upon which to form a conclusive opinion of the actual expense of the Works.*[48]

The Treasury took almost five months to respond to these documents, and even then its response was equivocal. Colonel Nicolls's objections were cited as the major reason for returning the estimate to the board for further consideration.[49] But what more could be said about it? Mulcaster made one last attempt, and produced the most blunt of his many letters and memoranda on the subject.[50] Angry because the Treasury had cited Nicolls's objections in their minute of 30 December, Mulcaster finally and unequivocally put the blame for the excessive cost on Nicolls. The excess had been the result of

1st The original project being incomplete.
2nd The Estimate insufficient. – and
3rd The failures (from insufficiency) of the Revetments.

The Treasury had used Colonel Nicolls's comments to object to the alterations made in the original plan. Mulcaster retorted acidly:

The Lords of the Treasury appear not to have adverted to the fact that the alteration of the Plan was first suggested by Colonel Nicolls . . . in his report dated the 5th Sept^r 1831, and the failures of the revetments were also received from that Officer. – Hence it is erroneous to question his opinion as to the "propriety or necessity" of the measures of improvement. It may be inferred that Colonel Nicolls does not coincide in the details of the measures, but they have been considered by the two late Inspectors General as well as myself and approved by Sir Jas Kempt and I am prepared to justify their necessity . . . from the insufficiency of the original revetments planned by Col. Nicolls, and the omissions in the original Estimate framed by that Officer.

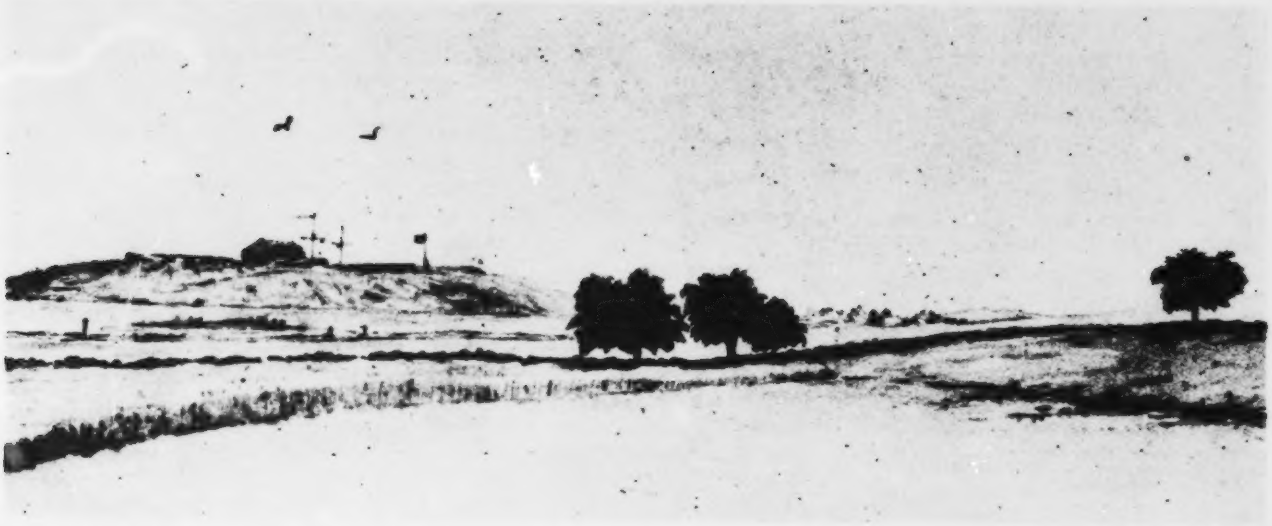
This time it took the Treasury only two months to decide. On 27 March, Spearman notified Byham that "their Lordships will not object to sanction the expenditure of such sums as may be granted by Parliament for this work."[51] On 4 April word of the decision was forwarded to Halifax.[52]

The approved plan which finally emerged from the long controversy closely resembles the Citadel as it now stands. Several of the components of Nicolls's original design were dispensed with altogether and many of the rest were substantially altered. The north and south cavaliers and the old magazine were the most prominent casualties. The old magazine was to be replaced by two new ones, one in the gorge of each of the western demi-bastions. The counterscarp and redan were both altered, the former by changes in the design and the latter by the addition of dwelling casemates. The changes in the counterscarp design eliminated the casemates of reverse fire and all of the countermines on the southern and eastern fronts.

VII

The Treasury's decision had come very late. While it was trying to make up its mind, Jones was becoming increasingly strapped for money. He asked for a mere

13 "Halifax Citadel and Common from Cogswell's Barn, near the Haunted House, 21st August, 1840." Watercolour by Colonel Mercer. Viewed from the northwest, the Citadel already looked rather imposing. A view from the east would have given a different picture. The eastern front was, at the time, barely started. (*Public Archives of Canada.*)



£4,474 7s. 3-3/4d. for 1838.[53]

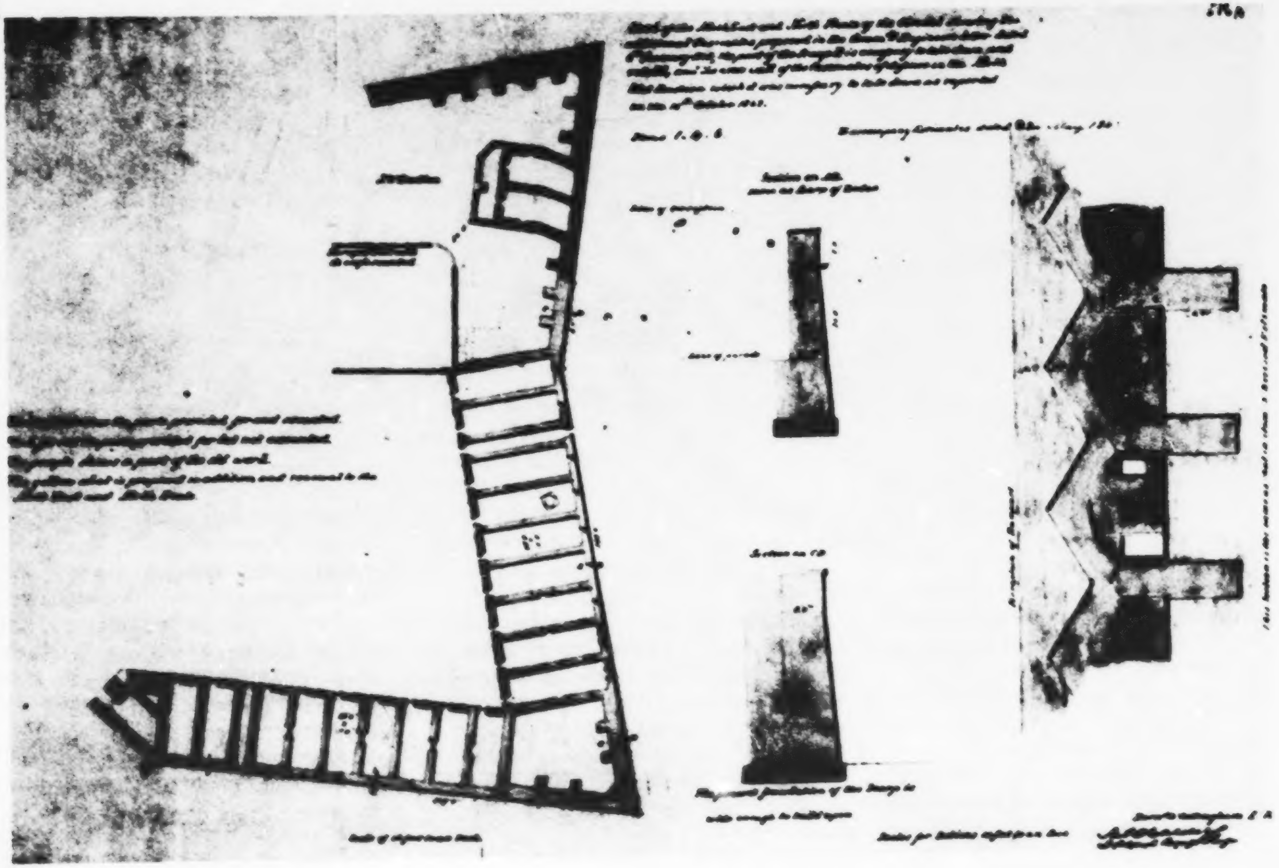
By the time the Board of Ordnance got round to acting on his request, the Treasury order had been passed. But the measure had yet to come before Parliament, and the most that Mulcaster could recommend was £2,000.[54] By this time the total unexpended balance was down to £7,516[55] and was still falling. The next year, the crisis finally having passed, Jones asked for £24,093 7s. 2-1/2d.[56] The board allowed him £5,000,[57] to which he could add an unexpended balance of £1,225.[58] A year later, all but £135 of it had been spent,[59] and Parliament finally granted a healthy £10,000.[60] The tempo of building returned to something approaching normal. The financial drought was over, and Jones was finally getting the chance to implement his plans after six years. As if to seal his success, he was given permission to remain on the station to finish the project.[61]

Colonel Calder Revises

I

The Citadel entered the second and final phase of its construction between 1840 and 1842. In these years the exterior of the fort, as definitively established by the revised estimate of 1836, was finally completed. There could be no fundamental alterations. In the second phase, the fleshing out of the granite and ironstone skeleton into a functional work of defence, a whole new set of problems arose. The difficulties encountered in the 1840s were in matters of detail – accommodation, waterproofing, interior partitions and so on. They required specific and detailed solutions which, of course, were quite beyond the general considerations provided for in the revised estimate and its supporting documents. Indeed, some of the problems were simply the

14 "Sketch of the North East and North Fronts of the Citadel," 1843. This plan shows the additional casemating proposed by Colonel Calder in his 1843 estimate. (*Public Archives of Canada.*)



result of the initial stages of building having taken so long. Many of the difficulties encountered with the cavalier, for example, arose from the fact that it was already more than 15 years old when the time came to make it fit for lodging troops, and it suffered from the maladies typical of any stone building left unoccupied for so long.

It was during this second phase that continuity in the building staff became important for efficiency. Colonel Jones had already been in Halifax for more than seven years and had, in effect, become the projector of the work. In the process, he had acquired enough experience with the Citadel to decide on matters of detail. He was also sufficiently well-established with the London authorities to be allowed a certain amount of latitude in his decisions. Any successor would have neither of these advantages.

It was probably for this reason that the Inspector General requested Jones to stay in Halifax until the work was completed. Then, less than a year later, London reversed itself. It is not known why. Possibly Jones himself requested it; he had been in Halifax eight years, longer than any other Commanding Royal Engineer. In any event, Jones was notified on 19 November 1841 that he was to be relieved.[1] His successor arrived on 8 March 1842.[2]

II

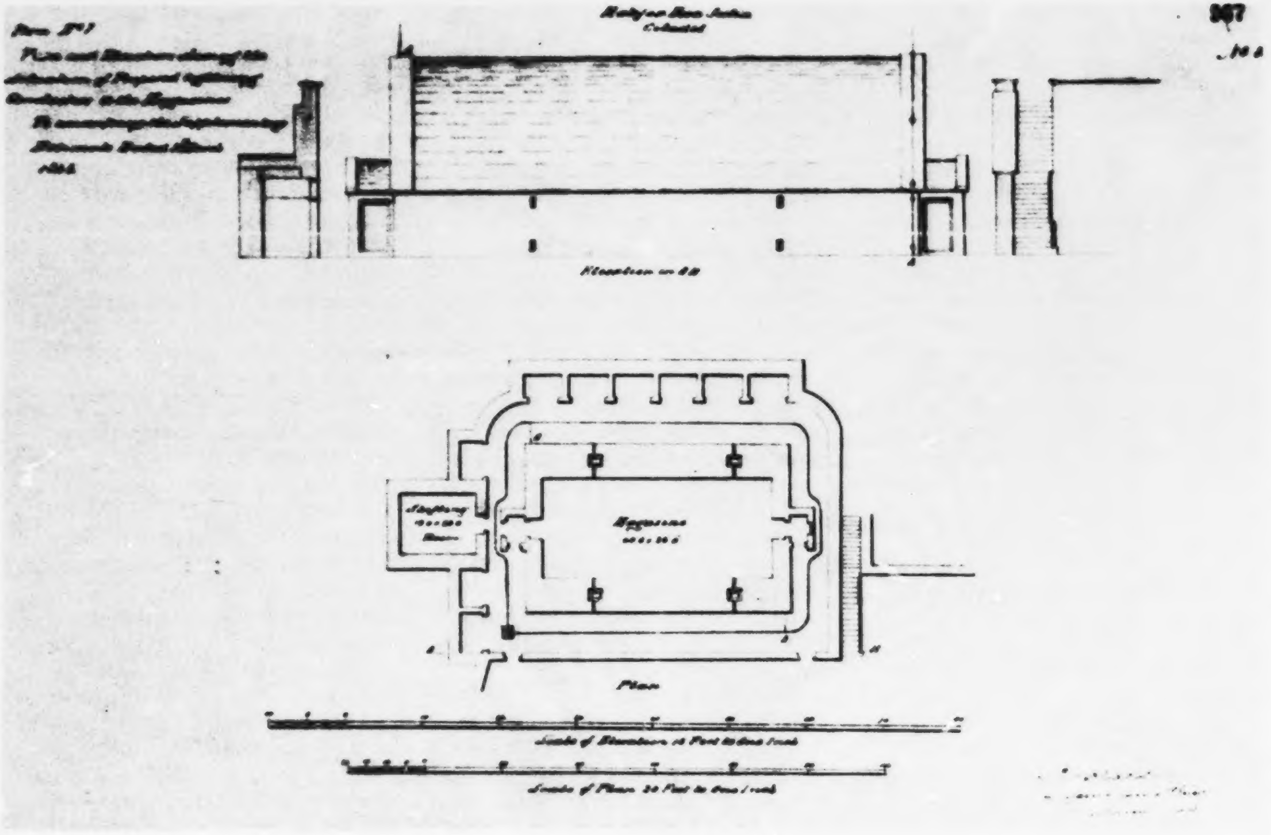
Lieutenant Colonel Patrick Calder arrived just as the final season of work on the exterior walls was about to begin. The northern, western and southern fronts were virtually complete (except for a few problematical walls dating from Colonel Nicolls's time and a defective west ravelin), and the escarp and counterscarp on the eastern front were both more than half finished. The interior of the fort, however, had changed little since 1832, and indeed since 1828. The old powder magazine still stood, perched by that time on top of an island of earth in the centre of the parade square. The new magazines were not yet begun, nor were the bulk of the casemates; and the cavalier, which looked imposing enough, stood empty and incomplete.[3] A newcomer walking into the place must have felt rather like a spectator blundering backstage at a theatre and seeing the sets from behind. Even an experienced engineer like Calder must have felt some discouragement at the amount of work still to be done.

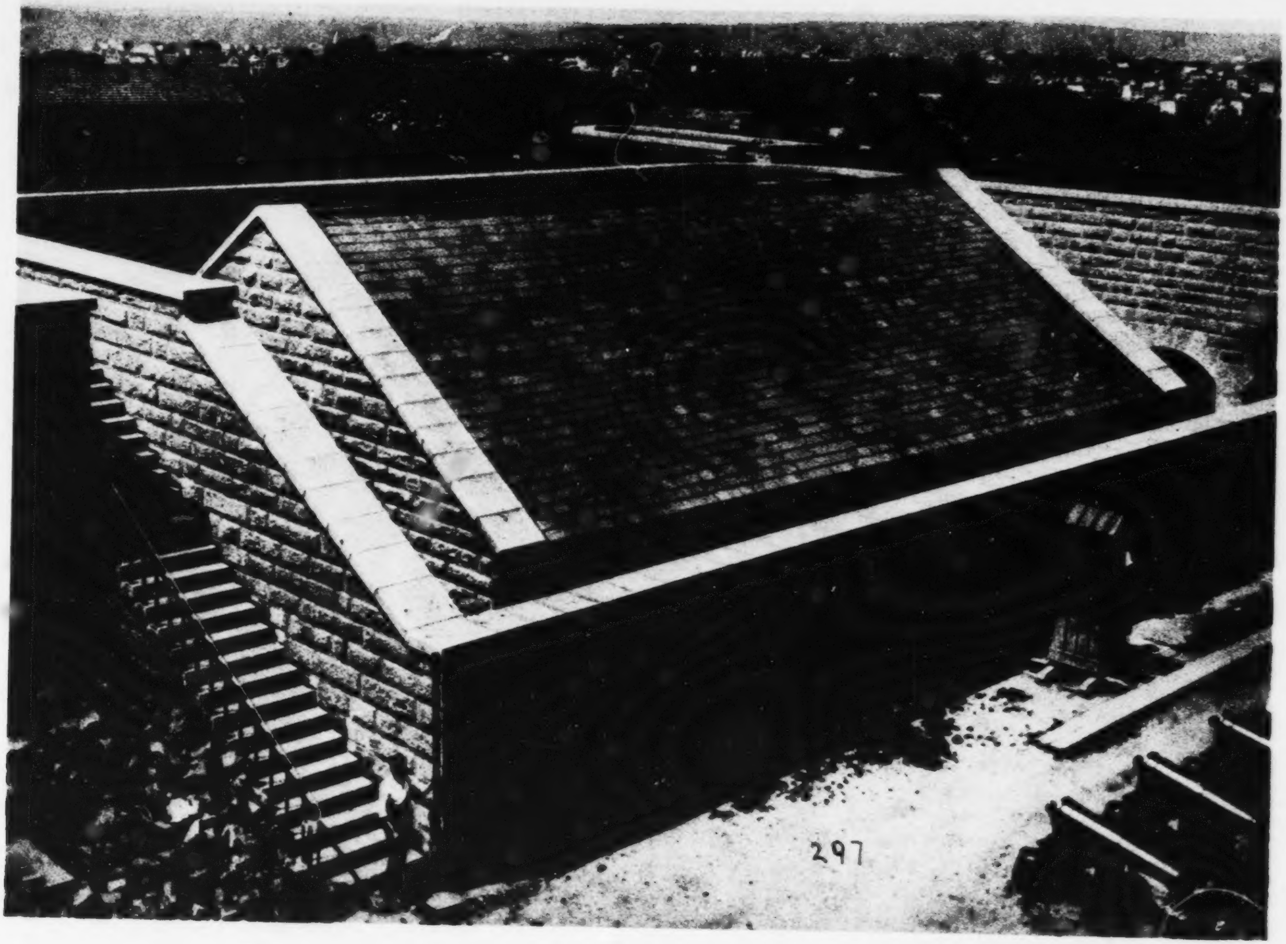
The first summer passed quietly. The work done cost £12,742 – about the average amount spent in a working season.[4] The only ominous event was the collapse of the area wall enclosing the stairs leading to the casemates of defence in the northwest bastion. It was the first such collapse since the early thirties and it immediately raised the question of the soundness of the other early walls. Calder's first progress report, dispatched on 30 June, contained an account of the collapse as well as of the other work in progress.

London's reply set the tone for Calder's relationship with his superiors for the next two or three years. The chief draughtsman of the Fortifications office, on examining the progress report, found it did not agree with his interpretation of the original 1836 estimate. His two complaints arose from an examination of the drawing accompanying the report. In one, the redan basement was shown without the area wall opposite; in the other, the main drain differed from that shown in a drawing in a previous report. Calder was instructed to account both for these discrepancies and for the failure of the area wall.[5]

The collapse of the area wall was easily explained; loading pressure and the poor quality of the mortar and masonry used in its construction were to blame.[6] The chief draughtsman's complaints were another matter. Both were essentially trivial and were easy enough to correct; in the case of the redan basement, Calder's draughtsman had simply omitted to draw the area wall, since it was irrelevant to the matter at hand, and in the case of the main drain, an error had been made in copying the original drawing. But it was obvious from the nature of the complaints that Calder had not yet acquired the confidence of the Fortifications staff in London, and that Jones's estimate, detailed as it was, was still liable to differing interpretations on specific points. This last fact suggested to Calder that the overall plan was open to improvement.
In his reply to the questions raised

15 "Plan and Elevation shewing the situation of Proposed lightning Conductors," 1846. The lightning conductors were installed (briefly) in this fashion and shortly thereafter failed. They were ultimately replaced by a different system. This is the earliest elevation of the magazine as built. (*Public Archives of Canada.*)





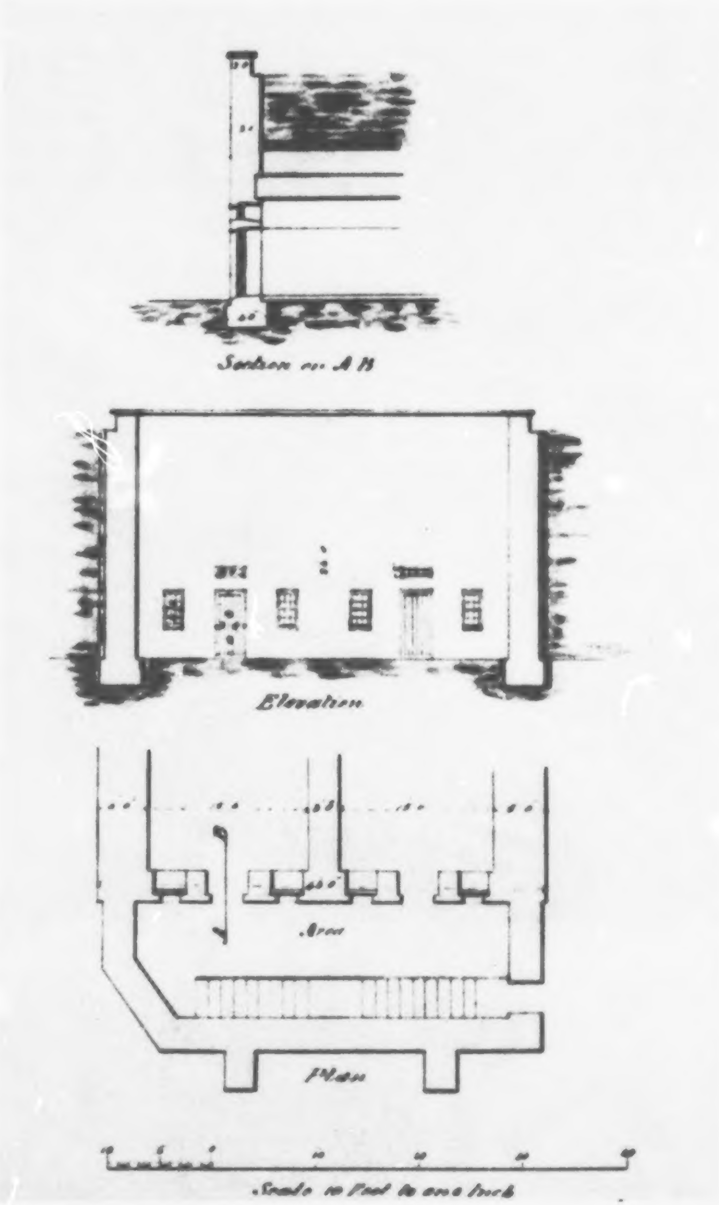
16 The north magazine and area wall, ca. 1880. The south magazine was identical.

by his progress report, he made his first tentative suggestion for alterations. Could not two or three new casemates be provided in the rear of the basement area wall to provide storage space for the officers' quarters? Such casemates, "though eventually necessary," had apparently not been foreseen in the original plan.[7]

When the working season ended, Calder finally had the time to examine Jones's revised estimate in detail. He concluded that it could indeed be improved upon by a few judicious additions, and on 6 January 1843 he submitted his proposals for improvement for the consideration of the Inspector General.[8] The tone of his letter was unprovocative and gentlemanly. He was not attempting to cast aspersions on Jones's ability, but merely recommending a series of minor improvements which either were too specific to have been considered within the broad scope of the revised estimate or had been made necessary by developments since 1836.

The changes included the provision of porches and shifting rooms for the new magazines, the cellars for the redan (already mentioned in his letter of 15 October), an alteration in the method of constructing the arches of the proposed cavalier additions, and the substitution of ramps for staircases

17 "Plan Elevation and Section of Retaining wall to two Casemates of Defence," 1846. *(Public Archives of Canada.)*



leading to the west ramparts. All of these were minor changes which tended to increase the efficiency of the completed work at little additional cost.

Calder also wanted to add more casemates. His argument in favour of doing so was based on an absurd misinterpretation of Jones's intentions. The latter had proposed strengthening the interior retaining wall by building arches over the supporting buttresses to form small cells or recesses which could be used for a variety of purposes. Calder misread the wording of the estimate and believed that it had been Jones's intention to carry the arches all the way through to the escarp. He noted that this had not been done in the case of those parts of the retaining wall already built, and went on to argue that, even if it had been done, the resulting space would have been too narrow to be useful. He proposed instead the substitution of full casemates in most instances, two in the re-entering angles of the redan and an unspecified number on the other fronts.

The collapse of the area wall in the northwest bastion once again led to a reconsideration of the early work. Calder's opinion was that

The whole of the scarp of the north front (excepting 120 feet of the right face of the N.W. Bastion) as well as the adjoining face of the East front . . . [is] *in such a state of dilapidation from the badness of the mortar used in the construction* . . . [and] *the inferior quality of the stone and the unworkmanlike manner in which it is built, as to render it advisable to take down & rebuild the whole from the level of the ditch.*

This, he considered, would account for the bulk of the additional expense he proposed – £7,000.[9] The other features he proposed could cost, in all, just over £5,000 for a grand total of £12,620.

When Calder's letter was received in London, a copy was immediately dispatched to Colonel Jones for comment. He replied on 1 March.[10] Apart from a mild rebuttal of Calder's misinterpretation of his design of the retaining wall, he was generally disposed to accept Calder's judgement. He did differ in certain points of detail. Jones had a curious theory about magazine construction: he disliked the idea of external porches and of north-end doors, both of which he considered unsuitable in the Halifax climate. Consequently, he suggested alterations to Calder's proposals for the magazines, while agreeing that porches and shifting rooms would improve the design. He raised a gentle objection to the proposed ramps:

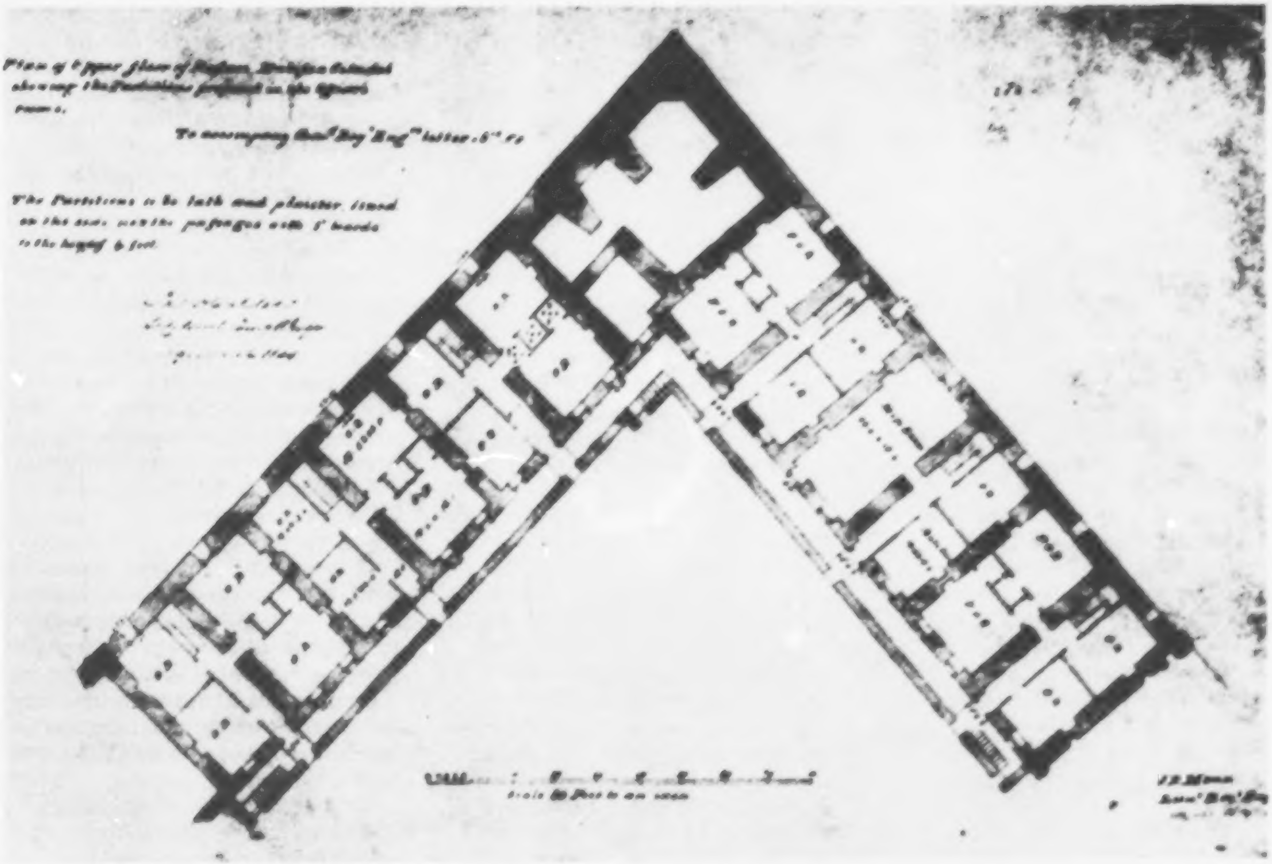
[They] *would give more ready access for guns &c to the Rampart but yet* [they] *seem objectionable from interfering with . . . the breadth of the Rampart at the Flanks.*

The judicious wording of the objection is, however, typical of the tenor of Jones's letter.

A letter from Lieutenant Colonel Edward Matson (the Assistant Adjutant General of the corps) enclosing the Inspector General's comments was similar in tone.[11] General Mulcaster blamed Calder's misinterpretation of Jones's design on an incorrect transcript of the 1836 estimate, and enclosed a true copy so that the Halifax version might be altered to read correctly. The Inspector General directed that Jones's plan be followed with respect to the cavalier and referred Calder to Jones's objection to ramps, but these things aside, he was willing to consider the remaining items. Additional casemates could be brought forward as items in the estimates if it was found that "the casemated accommodation already contemplated [is] insufficient." The cellar and shifting rooms items were both accepted in principle. The matter of the magazine porches and doors was referred back to Calder with instructions to confer with the "Officer of Artillery and the Ordnance Storekeeper" on the subject. Matson concluded by requesting detailed drawings and estimates for the proposed changes.

This exchange – gentlemanly, tactful and blandly reasonable – was in vivid contrast to the acrimonious exchanges which had greeted Boteler's first letters on the subject of alterations ten years earlier. Even as recently as 1840, Calder's proposals would probably have provoked a row, but in the intervening three years, attitudes had mellowed. The ensuing history of Calder's proposals, though almost as complicated as that of the 1836

18 "Plan of Upper floor of Redan," 1844. *(Public Archives of Canada.)*

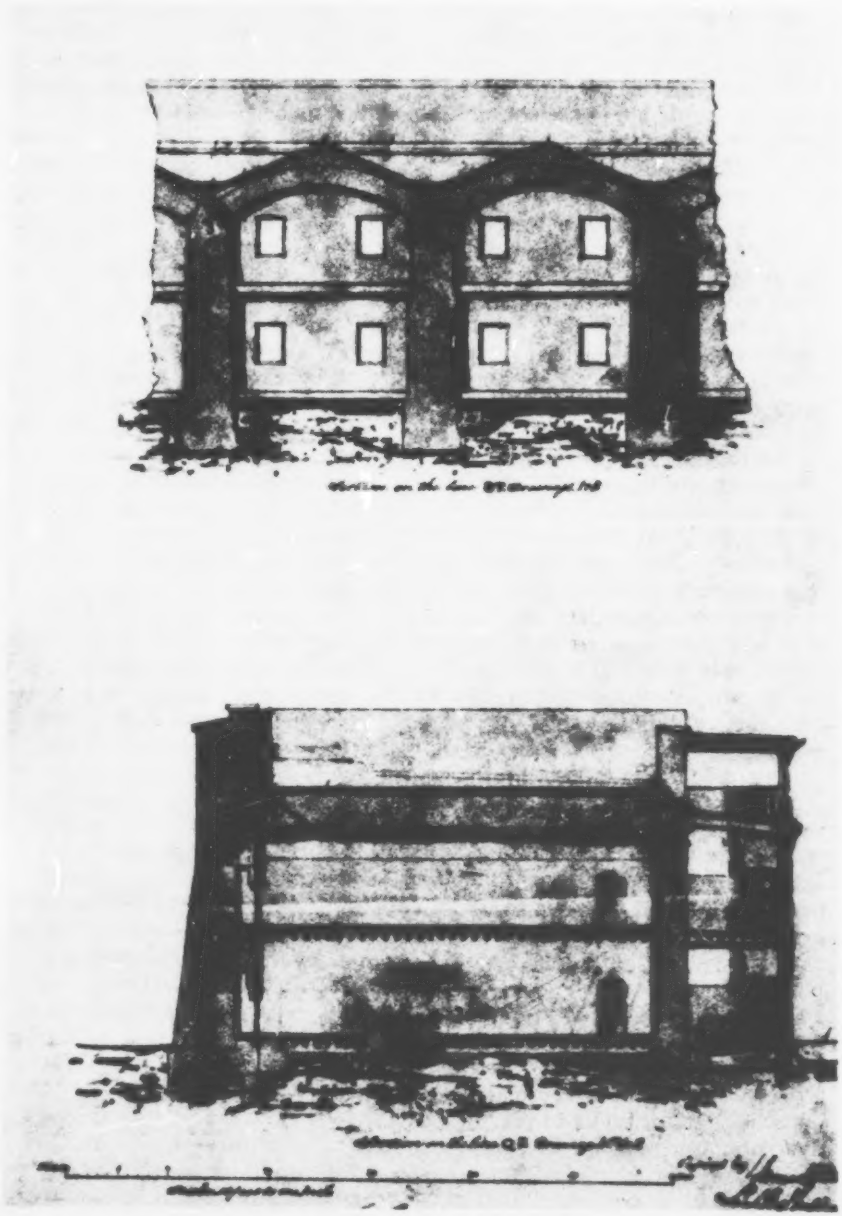


estimate, was relatively harmonious. The era of bitter controversy was at last over.

III

The Inspector General's invitation to justify the increase in casemate accommodation prompted Calder to do something which no one had thought of doing before. In late April, he canvassed the other department heads to find out how much space they would need in the Citadel, both in peacetime and for a siege of two months.[12] Since he wanted an argument for additional casemates, he encouraged his colleagues to submit the largest possible claims for space. The Deputy Commissary General replied that he would need three casemates for a summer siege and at least three more for a winter one. (No commissariat stores were kept in the Citadel in peacetime.[13]) The Barrack Master needed two casemates under any conditions;[14] the Commander, Royal Artillery (CRA), needed at least three;[15] the Ordnance Storekeeper, four. This gave Calder a maximum figure of 16 casemates beyond the ones he needed for the normal garrison of one regiment. He considered this sufficient justification for bringing forward 16 additional casemates in his new estimate.[16]

The estimate was completed on 22 May 1843.[17] It provided for all of the features mentioned in Calder's letter, excepting the ramps for the western ramparts. It also



19 "Sections of Cavalier showin [*sic*] the mode proposed for rendering the arches secure against leakage," 1849. This plan illustrates the drainage provisions of Colonel Savage's staunching estimate of 30 April 1849. It is impossible to tell to what extent it was carried out. (*Public Archives of Canada.*)

contained provision for fitting up the rooms over the end casemates of the cavalier and reconstructing the roofs of the magazines and ravelin guardhouses. In all, it amounted to £12,879 19s. 7d.

In his explanatory letter, Calder said little which was new. He had consulted both the CRA and the Ordnance Storekeeper on the arrangement of the magazines, and they had both accepted his proposals. As for Jones's objections to doors facing north, he noted that "all the magazines in Halifax stand north south and that each of them have [*sic*] doors in both ends." The two new aspects of the scheme were scrupulously accounted for. The cells over the cavalier end casemates were in response to a suggestion from the Major General Commanding. The substitution of rafters for cement on the dos d'anes of the magazines and guardhouses was the result of "the latter having shown itself unfit to resist the effects of this climate in the trials that have been made on the last mentioned Buildings."

The most interesting features of the covering letters were the three statements of accommodation appended to them. These were intended to support Calder's argument for more casemates, and they detailed the number of men intended for the Citadel's garrison. In all, the fort was designed for two field officers, 17 officers, 609 NCOs and privates and 39 women (the proportion of soldiers' wives allowed under regulations). In addition, provision was made for a 35-bed hospital in the cavalier and a schoolroom, as well as for the usual assortment of storerooms. The average number of privates per casemate in time of peace was 22.[18]

London acted very quickly. The Inspector General dispatched the estimate to the Master General and board on 1 July 1843.[19] In his accompanying letter, Mulcaster briefly reviewed the background of the proposals and recommended their acceptance.

> *The Estimate amounts to £12,879 . . 19 . . 7 and although its details have not yet been investigated by the Surveyor and some internal Fitments are omitted, it may I apprehend be taken as an Estimate sufficiently approximative to enable the Master General and Board to determine upon the additional Bomb proof accommodation and the omissions and renewals . . . which had not been originally provided for or have become necessary.*

He admitted that the renewals were "discreditable to the department," but could see no way of avoiding the expenditure. He concluded,

> *Should the Master General and Board sanction the view I have taken, after a careful consideration of the above named Reports and circumstances, I propose making the necessary communication without delay for the Commanding Royal Engineer's guidance, in proceeding with the construction, and that the detail of the several additions be examined annually as they may be provided for in the Estimates for Parliament.*

The board took less than two weeks to decide in favour of the new estimate,[20] and authorization was dispatched to Halifax on 18 July.[21]

IV

The method proposed by the Inspector General of approving funds for the new estimate signalled the beginnings of a change in the Ordnance accounting system. At some point between 1844 and 1847, the authorization of each item of expenditure as it arose in the annual estimates became standard procedure (in contrast to the old system of approving a general estimate and making annual grants against it). The new system had obvious advantages. It eliminated the embarrassment of over-running the original grant, as the Citadel account did at some time between 1847 and 1849 (the accounts for these years have not been located). It also, however, had one disadvantage. Like all changes, it produced a certain amount of confusion during its transitional stage. Not all the people involved understood the significance of the change, and one who did not was Patrick Calder who, in 1846, submitted yet another supplementary estimate for the completion of the Citadel.

The origins of this document are obscure. On the title page, it was credited as being in response to the Inspector General's letter of 18 July 1843[22] authorizing the earlier estimate for alterations. But the surviving copies of the Inspector General's letter of that date contain no indication that such an estimate was requested or even contemplated. Possibly Calder genuinely misread the letter; possibly the title page was wrong and the new estimate was in response to a later communication from London, since lost. Unless new evidence comes to light, it is unlikely that we will ever know the truth of the matter.

In its format, the new estimate reflected the new accounting system. The items were divided into six classes:

(*1*) Works first detailed in Calder's first estimate for renewals, and subsequently authorized in the annual estimates for 1844–45 and 1845–46.

(*2*) Works from the same source, brought forward in the current annual estimate and not yet approved.

(*3*) Additional services found to be necessary since the 1843 estimate.

(*4*) Services in the 1843 estimate "ordered to be brought forward as excess."

(*5*) Works necessary because of failures.

(*6*) Services necessary for the installation of the armament.

Of the 17 items, 14 were new since 1843. These included water tanks, a well on the glacis, flagging for the areas, lightning conductors for the magazines, water pipes and gargoyles for surface drainage, flagging for the cavalier dos d'anes, fitments for the casemates, and a picket fence around the glacis to keep out trespassers. In addition to the new features, provision was made for rebuilding works which had been considered adequate three years earlier. These included the west ravelin in its entirety and six casemates of defence (four in the curtain and two in the northwest bastion) which had been part of the initial construction. Calder had intended to provide for curbs and platforms for the guns, but since no decision had ever been formally made on the armament of the work, he was unable to estimate the overall cost of the service. The entire estimate amounted to £26,563 3s. 1-3/4d.

Calder's covering letter was brief. It repeated the time-honoured phrase used by successive engineers in submitting revised estimates: "I have reason to think the amount of this estimate . . . will complete the work."[23] He went on to say that he had considered returning to the use of caponiers, but had discovered that they had been removed from Jones's first estimate for reasons of economy. Apart from this, and a few comments on the lack of information about armament, he let the estimate (which was the most detailed one yet drawn up for the project) speak for itself. His arguments for each individual feature were contained in the preamble of each item. Thus the rebuilding of the west ravelin was necessary because "the gorge [had] fallen down carrying with it part of the guardhouse"; besides this, the escarp faces had "cracked from the foundations upwards in several spots."

One feature of the estimate was Calder's emphasis on securing an adequate water supply. He considered the two wells insufficient for a garrison in the event of a siege, and proposed two complementary methods of supplementing them. The first method involved the construction of two water tanks under the casemate next to the guardroom "to be supplied with rain water collected from the ramparts of the work by the surface drains" (item 4). The second involved the provision of protected access to a well on the glacis near the northeast salient (item 5). The means of access proposed was a tunnel, like a countermine, from the counterscarp gallery. These two, in conjunction with the two existing wells would, Calder considered, be enough to supply the fort.

The new Inspector General's assessment of the estimate was favourable but cautious.[24] (John Fox Burgoyne had been appointed to the post in July 1845.) He was disposed to accept most of the new features as "desireable" with the exception of the picket fence, which was, he thought, extravagant. But Burgoyne withheld final decision until he had better information. He therefore ordered that the document be returned to Calder for revision, that the CRA in Halifax be consulted on the subject of armament and that a scheme be submitted to the local commander of the forces for approval.

By the middle of July, Calder and Colonel Jackson (the CRA) had drawn up the armament proposal (*see* ". . . and keep your powder dry!" below).[25] Calder then proceeded to revise his estimate. Most of the revisions were minor. Asphalt was substituted for flagging in the magazine areas and an entry (item 3-1/2) was inserted for providing area walls in all three ravelins. Calder still did not estimate for the number of curbs and platforms needed for the proposed armament, although he did provide for 19 curbs for dwarf platforms, 12 wooden ground platforms and 12 wooden mortar platforms. The bulk of the revision consisted of alterations in the calculation of expense. The overall cost of the works proposed in the new estimate was put at £27,977 10s. 2-1/4d. excluding armament.[26]

Calder's explanatory letter was, as usual, brief. He enclosed a list of replies to the specific points raised by the Inspector General, and the armament proposal, signed by Colonels Calder and Jackson, and endorsed, as Burgoyne had instructed, by Major General Dickson, the General Officer Commanding in Nova Scotia. The replies, for the most part, revealed that Calder agreed with the Inspector General's opinions except in the matter of the picket fence. Calder maintained that Burgoyne had misinterpreted his original suggestion.

> *The enclosure proposed for the Glacis is a common picket fence and not palisading. It is very near as cheap as an ordinary post and rail fence, and affords greater protection against trespass of every description in a Country where whatever belongs to the crown is almost considered a common good, more especially where land has for a length of time lain unenclosed and been dailly* [sic] *overrun by cattle, goats, geese, &c.*

Calder requested that the lightning conductor estimate be revised in London according to the most approved opinion, this being a subject "where such diversity of opinion" existed. He debated the virtues of enclosing the ravelin guardhouses with an area:

> [It] *would be an improvement as a work of defence was the interior space sufficiently large, and it would render the building more wholesome in some situations, but in this climate where a deep narrow ditch is liable to be filled with snow . . . it is apprehended that the walls might receive more injury and the building be less fit for occupation than at present.*[27]

He concluded that proper drainage would meet at least some of the objections.

London answered on 15 September. Calder was instructed to bring forward the items providing for the water tanks, the well, the magazine areas, the lightning conductors, the water pipes and the cavalier roof in ensuing annual estimates. The Inspector General stood firm on the subject of the glacis enclosure and instructed Calder to substitute a post and rail fence for his proposed pickets. Calder's objections to the ravelin areas were also dismissed:

> *Your objection to the ditch or area to the guardhouse would apply to all ditches and Buildings in that climate if care be not uniformly and constantly taken day by day to keep the footings of all buildings . . . clear of snow.*

He was, therefore, enjoined to bring forward estimates for the areas when "the guardhouses in these outworks require reconstruction." As for the artillery plan, it was at present being considered by the Director General of Artillery and Calder would be notified when it was finally approved.[28]

The same day that this response was sent, the Director General wrote to Burgoyne, pronouncing himself satisfied with the artillery proposals.[29] The proposals were then submitted to the Board of Ordnance, which communicated its approval on 10 October.[30] A week later notice of the decision was dispatched to Calder.[31]

In his letter instructing Calder about the disposition of his proposals, the Assistant Inspector General, Colonel Edward Fanshawe, reminded him to adhere in future to the new system of annual accounts and to submit proposals for new works in the appropriate annual estimate. This spelled the end of the tradition of all-inclusive Citadel estimates. Calder's revision of his second supplementary estimate was the thirteenth[32] and last of a long and frequently confusing line. The change was symbolically appropriate. Despite all the disasters and crises of the preceding decades, the Citadel was visibly nearing completion, and major estimates were no longer appropriate to the situation.

It is a striking fact that all five engineers who held the post of Commanding Royal Engineer between

1828 and 1846 felt it incumbent on them to draw up large-scale estimates for the Citadel. Quite apart from the fact that the majority of these estimates were in response to genuine needs, we can, I think, discern in this pattern an attempt by each of the engineer officers to impose his own ideas on the work, to leave a monument to himself. To a greater or lesser extent, all five of them succeeded. But after Colonel Calder, no engineer had this opportunity. Calder's successors did not even have the chance, unlike Boteler, Peake and Jones, to gain some satisfaction from correcting, or trying to correct, someone else's disastrous mistakes. Calder's predecessors (excepting Nicolls) may well have looked on the work with a certain amount of satisfaction. To his successors, it was nothing more than an embarrassment.

Already in 1846 one future source of trouble was beginning to develop – hardly a disastrous problem, merely an irritating one which seemed to have no easy or permanent solution. It was becoming evident that the majority of the new casemates had a disconcerting tendency to leak.

". . . the necessity of remedying the leakage. . . ."

I

Colonel Jones, the Commanding Royal Engineer responsible for the introduction of dwelling casemates into the Citadel design, had believed that the problem of waterproofing them could be easily solved. His own design for the dos d'anes of the casemates had been relatively simple; the waterproof covering consisted only of tiling laid in cement. Lead gutters in the troughs between the dos d'anes allowed the surface water to be drained off.[1]

After some experience with the work, he had made a minor alteration. The tiles were indeed sufficient for those areas where a little dampness would never interfere with the purpose of the work – the counterscarp gallery and the retaining wall recesses, for example -- but for the dwelling casemates, something different was needed. He had, therefore, substituted duchess slate for tiling over the dwelling casemates on the grounds that it was "less liable to be affected by moisture . . . [and] little affected by frost if closely laid with cement."[2]

When Colonel Calder took over the command, he decided that Jones's method could be improved upon by the substitution of granite flagging for the slates and tiles.

> *Neither are* [sic] *well calculated, – the tiles because they are not at best but a porous material and, when covered with earth, liable to decay. – the slates because they are liable to be broken by the weight of the earth over them as well as liable to be affected by the intense frost in this country: – Hence in either case leakage may arise which it will be difficult to remedy. . . .*
>
> *To guard against this evil as much as possible, I beg to acquaint you that a sufficient quantity of good hard stone flags from 1-1/2 to 2 inches thick can be procured from our quarries to cover all the arches which, for a permanent work, appears to be preferable to tiles or Dutchess slates.*[3]

He proposed that the Ordnance approve the transfer of the funds allowed for the purchase of tiles and slates in England to the colony, to cover the cost of quarrying and truckage.

The Ordnance, as usual, took its time about making up its mind. While he waited, Calder drew up the first of his supplementary estimates in which he again proposed the use of flagging.[4] He also reported on an experiment he had conducted.

> *I had the two dos d'anes covered with Dutchess slates laid in cement, as provided for in the Revised Estimate; – The slates were carefully covered in . . .* [with] *the earth required to bring the terreplein . . . to its level: – Two others were covered with flags bedded in cement and laid to lap over each other as slates: – the flags were covered with small broken stones to the depth of six inches . . . to afford a passage for any wet that might soak through the terreplein and over these stones the earth was laid as above. –*
>
> *These casemates having been lately uncovered, several slates were found broken, scaled and loosened*

> *by the frost; – the flags are as perfect as when laid from which I conclude there can be no doubt that the latter is calculated to afford the most perfect security against fracture or leakage.*[5]

On the basis of his experiment, he again requested London's permission to make the substitution.

London equivocated. Calder was authorized to continue experimenting with flagging, but was not given final authorization to use it on all the casemates. Instead, the Inspector General suggested a new possibility – the use of "asphalte or other bituminous ingredients" to cover the dos d'anes.[6] Calder's reply to this has not been located, but it seems that he did not act on the suggestion. The new casemates proposed in the supplementary estimates duly appeared in the annual estimates, each providing for the use of flagstones, and London apparently approved them.[7]

The matter was, however, not quite settled. Calder and Mulcaster maintained their respective positions on the relative virtues of asphalt and granite flagging as building materials. Calder proposed the use of flagging for the magazine areas in his second supplementary estimate (1846).[8] Mulcaster countered by suggesting that asphalt would be more appropriate.[9] Calder, in turn, finally agreed to give the material a try: "Asphalte has not been tried in this command but this would afford a good opportunity to do so, as should it fail, flagging can be had recourse to."[10] Asphalt was so little in use at the time that Calder had no idea of the costs involved, nor had he any knowledge about applying it properly. He requested more information from London. And there the matter rested for another three years.

II

The first leaks in the redan casemates came into notice in the winter of 1844–45, but Calder, considering them merely the result of the rampart earth not having had time to settle, had not reported them to London.[11] In fact it was not until a winter rainstorm followed by a particularly bad thaw made the leakage widespread that Calder felt impelled to make his superiors aware of the problem.

> *I have the honour to report for your information that . . . the front and rear walls of the Officers Casemates in the Redan . . .* [became] *exceedingly damp from the water passing into them at their junction with the dos d'anes of the arches, which is evident by its dripping from the joints of the inner soffits of several of the doors and windows.*[12]

The leaks had occurred only in those casemates which had been built to the specifications of the 1836 estimate. Calder noted with satisfaction that those built as a part of his own project had remained dry. In the latter he had made liberal use of the permission to experiment which Mulcaster had given him five years earlier. The problem, he thought, arose from the fact that the dos d'anes were not carried through into the adjoining walls. To correct this, he had hipped the dos d'anes at each end and counterflagged the resulting slope. He had also altered the coping of the counterscarp to allow surface water from the parapet to run into the ditch. He proposed that similar measures be taken in the redan, and enclosed an estimate detailing the expenditure – £1,369 18s. 4d. – needed to carry this out.[13]

Calder may have been relatively hopeful, but London was not. The letter and estimate made the rounds of the Fortifications department and everyone found fault with them. The surveyor noted that the specifications for the 1836 estimate, although ambiguous, seemed to have been disregarded in the construction of the arches, which had (according to the surveyor) not been carried far enough into the end wall.[14] Burgoyne was sufficiently disturbed to request that the Commanding Royal Engineer in the western district of England supply information on the method used to staunch the casemates of the Plymouth Citadel.[15] No one seems to have given any serious consideration to Calder's proposal or to his estimate.

Colonel Matson replied to Calder's letter on 27 March. He made no mention of Calder's proposal. He noted that it was General Burgoyne's opinion that the trouble had been caused by deviating from the approved plan. He enclosed material detailing the methods in use in Plymouth.[16] These methods, indeed, were vastly different from Calder's since they involved the extensive use of asphalt and brick. Although one of the documents included contained an admission that asphalt had been tried at Fort Henry in Canada West without success, the point was not mentioned in Matson's letter.

Calder, in reply, defended the method he had used in constructing the arches. He noted that he had merely followed the method already used by Colonel Jones before his arrival. He reiterated that the problem occurred only in the redan casemates and only around the end walls, and once again brought his proposal forward, noting that it had been employed successfully. As for asphalt,

> [It] *has not been tried anywhere in this command, and I am humbly induced to think its efficacy in preventing the leakage under consideration extremely doubtful, though it may answer in the mild climate of Devonshire.*

If, however, London was determined to experiment with it, he requested that he be sent "a person well acquainted with its use."[17]

London was still not inclined to listen. Matson next instructed Calder to write to the Commanding Royal Engineer in the Canadas "for the purpose of obtaining information as to the respective nature of the defects which have occurred at the two stations and the means which have been reported . . . to have answered at Ft. Henry."[18] Calder did so on 19 June.[19] He did not make another attempt to propose his own scheme to the Fortifications department. He was about to be relieved at Halifax; his successor could deal with the problem.

III

Lieutenant Colonel Henry John Savage arrived at Halifax on 21 July 1848.[20] Calder apparently stayed on for a few weeks in order to acquaint the new Commanding Royal Engineer with local conditions, but once again the Ordnance had destroyed the continuity of the work. Within two weeks of his arrival, Savage found himself confronted with the problem of quartering garrison soldiers in his leaky casemates. One suspects that Calder left the city with a sense of profound relief.

The army had been waiting for 20 years for the promised barrack space in the Citadel. Finally, in the summer of 1848, it decided to wait no longer. On 5 August, the Deputy Adjutant General of the Forces in Halifax wrote requesting "three or four of the rooms completed within the Citadel as additional Barrack accommodation for the time this garrison shall continue in full force."[21] Savage replied, offering casemate barracks for two officers and 80 men.[22]

The stationing of troops within the Citadel changed an irritant into a major problem. An empty casemate which leaked was one thing; a leaky barracks was something else again. The presence of a garrison in an incomplete fortress, moreover, created problems which had never arisen before. When the first troops marched in, there was still a good deal of basic construction left to be done. The rather disorganized state of the place gave the troops ample opportunities to cause trouble. In less than a week, they were doing so.

The redan counterscarp was still incomplete and the arches had yet to be turned over the gallery. This meant that it was possible to pass easily from the ditch to the glacis. On 14 August Major Crutchley of the Royal Welch Fusiliers wrote to Savage complaining about the negligence of the Engineer department in not keeping the doors to the casemates of defence locked. It seemed that the garrison soldiers were taking advantage of this oversight to gain access to the ditch through the embrasures and, in this way, to make unauthorized excursions into town.[23]

Savage was exasperated. It was bad enough having to cope with the problems of construction without the interference of the day-to-day difficulties of the garrison. But what could be done? The army, having got a foothold in the place, was hardly about to leave again. To make matters worse, London was putting on pressure to have the situation regularized. It was not the custom to have troops quartered in premises under the control of the Ordnance. On 25 October Fanshawe wrote instructing Savage to "ask for the requisite authority for transferring to the Barrack Master as soon as distinct portions of the whole shall be ready the Barrack accommodation that has been authorized and constructed in the Citadel."[24]

The same day, Calder on his side was writing to the Inspector General explaining why this could not be done.

None of the rampart casemates in the Citadel are completed for Barr^{k} *accommodation, which has been delayed in consequence of the necessity of remedying the leakage at present existing.*

He went on to explain that he was drawing up a special estimate for staunching the casemates and would forward it to London at the first opportunity.[25]

Fortunately for Savage, a concensus on the best method of staunching was beginning to emerge. One of the first letters to arrive after he had taken over the station had been from Colonel Holloway, the CRE in Canada, describing the system in use at Fort Henry. This was, in some respects, similar to the one Calder had proposed. In addition to hipping the dos d'anes, the engineering staff in Kingston had made use of asphalt and brick and had constructed a system of internal drains which conducted the water from both the rampart surface and the dos d'ane gutters through the piers between the casemates to a drain running under the casemate floors.[26]

The drainage system which had been adopted in Halifax was much less effective. The dos d'ane gutters, as originally designed, had emptied through a gargoyle in the rampart retaining wall. The trouble with this system was that the mouths of the gargoyles were likely to be stopped up by ice in winter, trapping the water in the gutters and rampart earth and subjecting the dos d'anes to erosion by frost. The method used in Kingston was obviously superior and Calder, who had been notified of the contents of Holloway's letter, recommended its adoption.

I would . . . suggest that the pipes intended to convey the water from the gargoyles be fixed within the building and be attached to lead gutters in the valleys [of the dos d'anes] *about where the counterflagging meets them; – this would secure the pipes from the effects of the frost, and would render its effect on the gargoyles of no consequence; – the brick arches can be easily pierced to effect this.*[27]

He had no comments to make about the probable effectiveness of asphalt.

In the end, of course, it was Colonel Savage's responsibility to propose solutions to the Citadel's maladies. By the fall of 1848, he had come to realize that he faced three distinct but related problems: drainage, waterproofing and accommodation. London shortly added a fourth: water supply. On 29 November Fanshawe wrote requesting plans and sections showing "not only the work itself with its relief & Glacis . . . but also the drainage, foundations . . . supply of water, &c."[28]

Even as Fanshawe wrote, Savage was hard at work on two of the problems. On 21 November he had instructed Captain Burmester and Richard Hawken (the Clerk of the Works) to make a thorough inspection of all the Citadel casemates. These two gentlemen were selected for the task because they were the two Ordnance officers with the greatest experience of conditions at Halifax. Savage was only too well aware that he was a newcomer who had yet to encounter the rigours of a Halifax winter.[29]

Burmester's report, written on 30 November, more or less confirmed Calder's report of the preceding February. All those casemates which had been hipped and flagged were dry. On the other hand, all those which had been tiled and most of those which had been provided with flagging alone were damp. Of the 54 rampart casemates, 24 were reported dry and the remainder, including all the redan casemates, were not.

The report also revealed that no fewer than five different methods of covering the dos d'anes had been employed over the years. Of the 54 casemates, 12 had been flagged and hipped; 30 had been flagged; 2 still had their tile coverings; 4 had a combination of tiles and dry flagging. The remaining six were flagged, hipped and fitted with internal drain pipes. Someone, presumably Savage, had already begun to experiment with the method used successfully at Kingston.

A large portion of Burmester's report dealt with the question of drainage. After describing the construction of the arches, dos d'anes and gutters, he continued,

> *The gutter led through the interior retaining walls into the body of the place, having gargoyles projecting about 18" beyond the face of the wall, – but the openings of which are entirely exposed to the action of the weather and consequently are during the winter months completely closed by the frost acting upon the water that would otherwise drain off and I have no doubt but that ice is formed in the gutters through the whole thickness of the wall, by which means the exit of the remaining portion of water is prevented until the spring, thus putting the masonry of the arch to a most severe test.*

This was not, however, the entire explanation for the leakage.

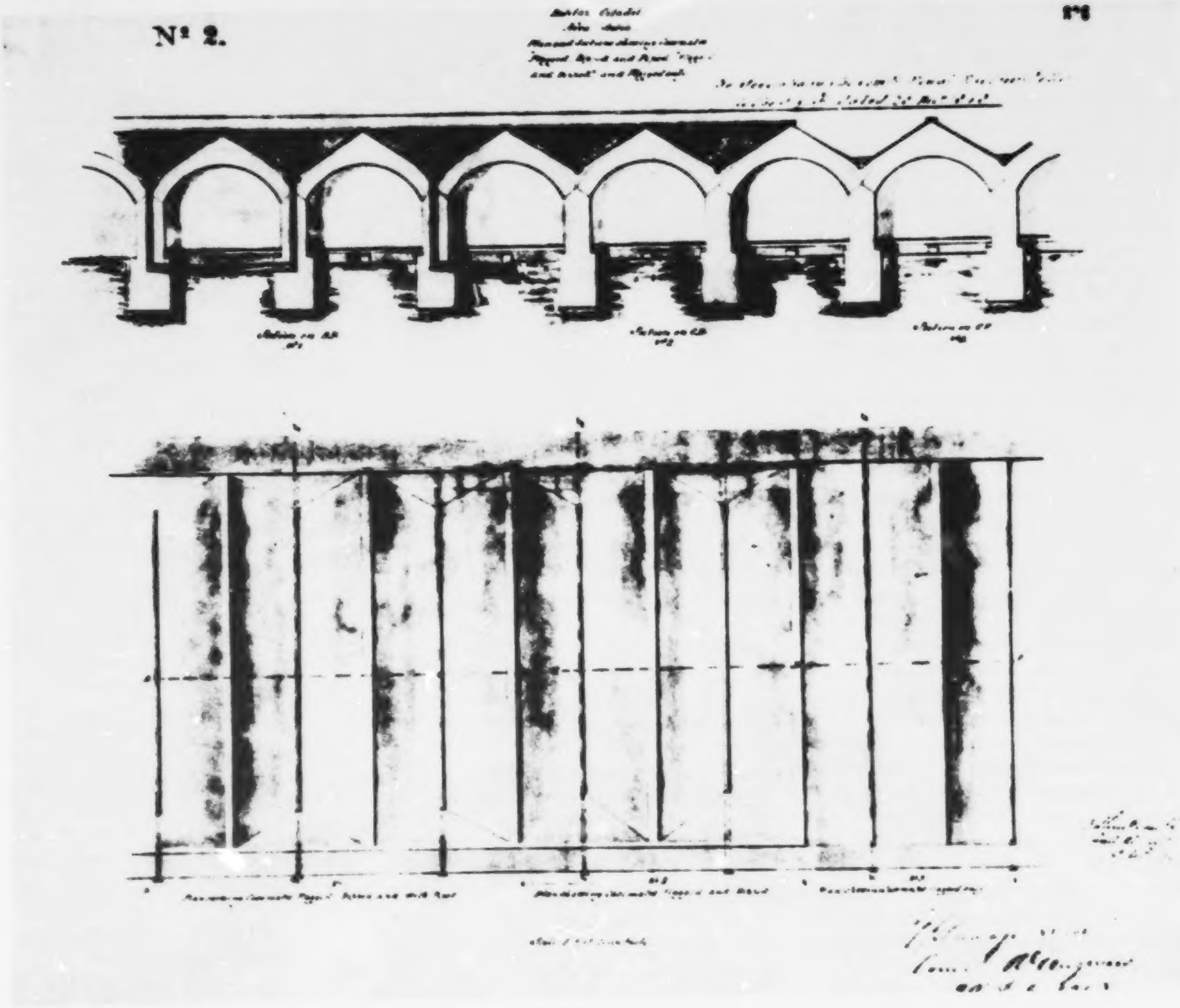
> *From the forgoing it appears that the casemates which are flagged, hipped and piped are, in every respect dry as regards leakage and that, although the gargoyles may freeze, the water passes off through the pipes, there thus being no chance for the water remaining on the covering of the arch and leaking through by being retained there, – also those that are flagged and hipped have hitherto been found completely staunch, the hipping and flagging being sufficiently water tight to resist the leakage of water where the gargoyles are closed. Those that are flagged only . . . leak and this leak invariably occurs at the ends of the arches, the water not being thrown off as in the other casemates from the retaining scarp and interior walls by being hipped. . . .* [those that] *are dry flagged and tiled or tiled only are likewise defective in a similar manner. . . . I have also to state that the arches are dry throughout their whole length in every case although* [one] *appears a little damp in the arch, no leakage has yet occurred.*[30]

On the basis of this evidence, Burmester did not think it necessary to adopt the system of internal piping in all casemates. He felt that since hipping and flagging had, by themselves, seemed to be adequate for the task, it was only necessary to complete the hipping of the casemates and to retain the system of external drainage through the gargoyles. He pointed out that an internal piping system, which would involve cutting through the arches and piers, would be expensive. He also pointed out that the symptoms of the problem in Halifax were somewhat different from those which had appeared in Fort Henry. At Fort Henry, the water had percolated through the entire length of the arches; at Halifax the leakage was the result of the comparatively weak join between the arches and the external walls.

Burmester concluded by alluding to the plan for collecting surface water from the terreplein put forward by Calder in his 1846 supplementary estimate. This was the only drainage plan which had ever been drawn up and was relatively simple. It involved connecting the surface gutter running along the rear of the terreplein with water storage tanks under one of the casemates (No. 50) by means of drain pipes and an underground pipe. As yet, this had never been proposed in the annual estimates, and Burmester suggested that it ought to be so proposed quickly since it would, he felt, "in great measure remove the evil complained of by turning the water almost entirely off the covering of the circles." He did not explain how this system, consisting as it did of an open gutter and external piping, could be expected to work in winter.

Savage, in forwarding Burmester's comments to London, skillfully used his subordinate's opinions as a counterpoise to his own suggestions. He was not as optimistic as Burmester about the waterproofing qualities of flagging and hipping, but neither was he happy about the trouble and expense which would be produced by the adoption of all the techniques in use at Fort Henry. At Fort Henry the dos d'anes were covered with a course of brick laid in cement and flushed with asphalt. At intervals drains running from crown to gutter were laid on top of this, and the drains were then surrounded and covered by more courses of brick set in the same manner as the first. Savage pointed out that the adoption of this system would entail the uncovering of all the casemates, the removal of the flagging and the substitution of brick, asphalt and drain pipes. This, he recommended, "should not be done as, I presume to consider it unnecessary, the flagging and counterflagging having fully answered the purpose of preventing leakage thro. the arches." He recom-

20 "Plan and Sections shewing Casemates 'Flagged Hipped and Piped;' 'Flagged and Piped' and Flagged only," 1848. This plan was drawn to accompany Savage's letter enclosing Burmester's account of the state of the casemates. The three methods of staunching shown here were actually in use at the time. The most elaborate of the methods was the one favoured by Savage and the system for staunching he proposed in the following spring was based on it. (*Public Archives of Canada.*)



mended instead that "all those not so constructed" should be flagged, hipped and counterflagged. These, he reckoned, numbered 34.

Unlike Burmester, Savage was not at all sure that this alone would prevent leaks. He agreed that an internal drainage system was superior to an external one but, like Burmester, pointed out that the former would involve cutting through the piers of the casemates. As these were constructed of "large blocks of extremely hard ironstone" and therefore would present difficulties, he suggested that a better solution would be to "jump a hole from the gutter in the valley through the haunch of the brick arch and carry the pipe cased with 9" brick work down in the angle of each room."[31] He concluded by recommending that the height of the retaining wall in the redan be raised by 2-1/2 feet (the existing one stopped flush with the terreplein). He considered that water passing under the coping and down the inside of the wall was responsible for some of the leakage.

Even Savage's relatively modest alterations resulted in a substantial change in the system of drainage. He proposed that all the down pipes within the casemates (with the exception of those in the four isolated bastions, Nos. 12, 13, 59 and 60) be connected with a system of underground piping which would lead to the main drain. This was a considerable improvement in Calder's original proposal and, like the rest of Savage's suggestions, had the merit of comparative cheapness. All things considered, Savage had reason to be pleased with himself while he waited for London to respond to his letter.

IV

While he was waiting, Savage addressed himself to the problem of accommodating the troops. The technicalities of keeping the casemates dry were only part of the difficulty. Another source of trouble was the direct result of an army decision to increase the amount of space allotted to each man in the barracks. The decision was in itself undoubtedly a laudable one, but it led, apparently, to the existing barrack space in Halifax failing to meet the new regulations, and therefore increased the pressure on Savage to allow troops to be quartered in the Citadel. Unfortunately, it also decreased the number of troops the Citadel could accommodate. On 22 December, Savage dispatched a letter enclosing his calculations of the number of enlisted men who could be housed in the casemates originally intended for that purpose in the Citadel. His calculations showed that 234 fewer men could be accommodated under the new regulations. He also noted that nothing was being done to alleviate the overcrowding in the existing barracks until the Citadel was ready to receive its full complement of troops.[32]

Without waiting for London's observations on the subject, Savage set about finding a method whereby the Citadel could be made to house the full garrison originally intended for it. He had two choices: the construction of new casemates or the reduction of the number of supply casemates. Not surprisingly, he chose the second.

In computing the number of casemates needed for stores in 1843, Calder had canvassed the Ordnance department heads to find out how much space they would need both in peace and wartime. He had done so in order to support his contention that additional casemates were necessary (*see* above "Colonel Calder Revises"). Not surprisingly, given his purpose in conducting the survey, he had encouraged his colleagues to submit the largest justifiable claims they could. Now Savage faced the necessity of going through the same process in reverse. He canvassed his colleagues to find out the *minimum* space they could get by with. Fortunately for him, all of them co-operated. The Ordnance Storekeeper replied that he needed no space at all in the work in peacetime.[33] The Deputy Commissary General proposed to keep only a small amount of coal in the fort during the winter and agreed to keep both the bulk of the coal and all the foodstuffs elsewhere.[34] The Barrack Master and the CRA needed one casemate each.[35] This left Savage with the majority of casemates for quarters, and in early January he set about formulating an accommodation plan.

The letter in which Savage submitted his plan was written in response to London's request that he seek authorization to turn the casemates over to the Barrack Master. Savage began it by explaining why this had been possible only for the cavalier casemates, and referred General Burgoyne to his lengthy explanation of the technical difficulties of keeping the casemates dry, mailed a couple of weeks earlier. He then went on to detail the methods he proposed for circumventing the problem of housing the requisite number of troops without violating the regulations. In addition to cutting down the number of storage casemates, he proposed the elimination of the hospital in the cavalier on the grounds that the garrison hospital was nearby. He noted that, in the event of a siege, space could easily be found for the necessary stores by doubling up the non-commissioned officers. He felt, therefore, that he was justified in submitting a scheme in which only six of the 54 casemates were used for storage. In the remaining 48 he proposed to quarter 19 officers, one quartermaster sergeant, 5 staff sergeants and 374 men. There were, in addition, to be 234 men in the cavalier and 39 in the ravelin guardhouses, for a total of 608 enlisted men. This was still fewer (by about 60 men) than Calder had originally intended, but it was the best Savage could do.

He did not entirely rule out the possibility of additional casemates. He noted that there was no space for any services for the troops in his proposed scheme. Some of the missing facilities were, in fact, fundamental. No provision was made for a wash house, a tailor's shop, a library, an armourer's shop, a lavatory or an adequate orderly room. If these were considered necessary, he proposed to construct additional casemates in the east face of the southeast salient.[36]

London failed to appreciate Savage's efforts. About the same time that his letter detailing the methods by which he proposed to avoid the reduction of the Citadel garrison arrived in London, the Secretary of State for War and the Colonies handed down a decision approving the reduction.[37] In this way, General Burgoyne found himself in the position of simultaneously considering Savage's proposals and the government's approval of the very thing those proposals were designed to prevent. Apparently without taking the trouble to acquaint himself thoroughly with the circumstances of the case, the general handed down a decision which demonstrated a complete misunderstanding of Savage's problem. He instructed Savage to canvass the department heads for "returns of the accommodation each will *require for the Citadel itself* [emphasis his], as well as for the garrison of Halifax" and then to confer with the commander of the forces on the number of casemates needed for stores and hospital purposes as well as for barracks. The fact that Savage had already canvassed the department heads about their space requirements "for the Citadel itself" seems entirely to have escaped him.[38]

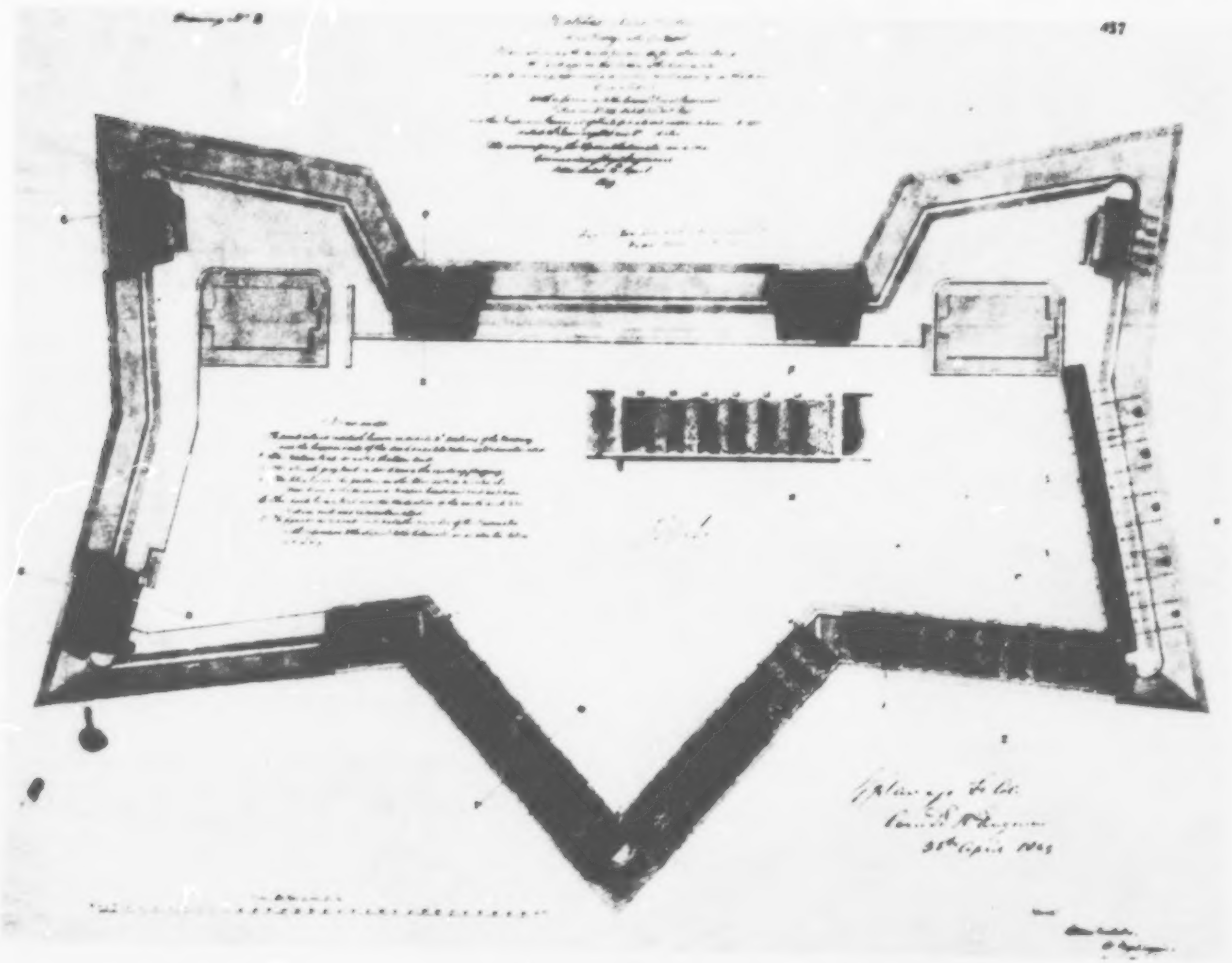
The whole matter was, in any case, a bit academic. In considering Savage's proposal for additional casemates, Burgoyne observed tartly that "The first thing is to make the existing casemates habitable." As long as the casemates continued to leak, the allocation of space within the Citadel was of no immediate concern.

V

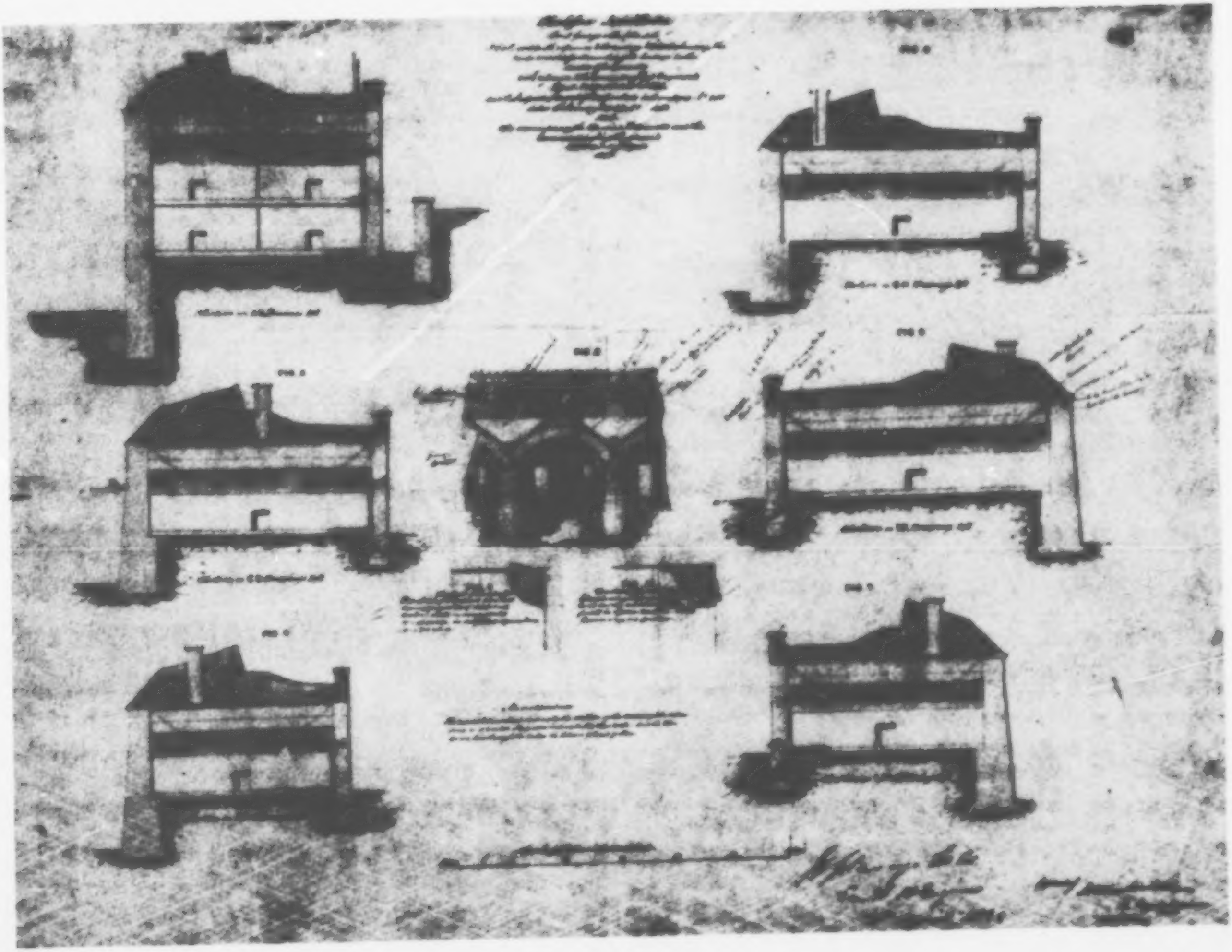
Burgoyne's reaction to Savage's proposed staunching methods for the casemates was one of reluctant approval. He still believed that the problem would never have arisen if the specifications set out in Jones's 1836 estimate had been adhered to rigorously. "It has been repeatedly shewn that the Com^{g}. Engineers at Halifax had disregarded the construction authorized by the I.G.F. for *carrying the arches through the walls* [emphasis his]." As this mistake could not be corrected, however, the Inspector General saw no choice but to adopt the remedy Savage proposed. He also agreed that the system of external drainage was inadequate since it subjected "the Masonry and arches . . . to a very severe and unfair test."[39]

Savage's private thoughts on the justice of Burgoyne's outburst have, unfortunately, not survived. The mistake alluded to (if indeed it had been a mistake; the 1836 estimate is ambiguous) had been committed by his predecessors. He was only trying to correct the situation. In spite of this, however, Burgoyne's minute must have left him with

21 "Plan showing the mode proposed for staunching the leakage," 1849. This plan was drawn for Colonel Savage's staunching estimate of 30 April 1849. Eleven casemates are not shown in this plan. Of these, six (Nos. 1, 2, 10, 11, 56 and 57) had already been fitted out in a manner closely resembling that described here. The remaining five were all small casemates (Nos. 6, 7A, 33, 42 and 51) and it was not proposed to provide them with elaborate waterproofing. (*Public Archives of Canada.*)



22 "Sections . . . showing the mode proposed for staunching the leakage," 1849. The system finally adopted for staunching differed considerably from the one shown here, but these sections are useful for the detail they provide of the layout of the casemates. (*Public Archives of Canada.*)



a sense of relief. London was, it seemed, going to accept his plan. He therefore set about preparing a formal estimate based on the proposals set forth in his December letter. The estimate was dispatched to London on 30 April 1849.

As he had intimated in his December letter, Savage's scheme was comprehensive; it covered staunching all the casemates, including those in the cavalier, as well as drainage and water supply. It was not particularly expensive; the total cost was £3,766 2s. 2-3/4d., of which £1,262 had already been allowed for pipes and tanks (the 1846 supplementary estimate) and for surface drainage (the 1836 revised estimate). This left a mere £1,504, which was only slightly more than Calder's estimate for less extensive repairs in the preceding spring. Savage noted that the whole of the proposal – staunching, drainage and tanks – should be carried out simultaneously in the interests of efficiency, and proposed that two of the items authorized in the annual estimate for the current year be postponed and the funds diverted to the new project.[40]

Savage's proposal ran straightaway into difficulties. One of the two authorized items which he wanted to delete from the annual estimate was that providing for a covered passage to the well on the north slope of the glacis. Even as Savage was recommending its postponement, he was having second thoughts about the wisdom of building the passage at all. In reply to a memorandum from the Surveyor of the Ordnance suggesting an alteration in the proposed pumping system, Savage wrote,

Since the formation and introduction of that item in the Estimate what used to be the best well in the Citadel [i.e., the north well] *has lately at times been nearly dry, caused it is supposed by some of the inhabitants having met the same spring lower down in the City sinking new wells –*

This being the case, he proposed that the expensive scheme for using the glacis well be entirely abandoned and the money used to sink the north well to a greater depth.[41]

This brought up, once again, the whole question of the adequacy of the Citadel's water supply. Burgoyne immediately requested a report on "the best means for securing to the Citadel under circumstances of Attack as well as otherwise an adequate supply of water for the daily use of the Garrison."[42] This request duly became the basis for one of the Inspector General's excuses for deferring the staunching project. Noting that "the staunching of the Casemates, the drainage from the dos d'ânes and the Rampart, the surface Drains, Tankage and the water supply" were all inter-related problems, he requested that "the C.R.E.'s Report & Estimate (however shown in parts) should detail the whole system and expense of what is required before bringing the subject before the Master General and Board."[43]

In making this request, Burgoyne pointedly ignored the fact that Savage's estimate *had* met all the things required of it but one: it had not gone into any great detail about the water supply. Nor were Burgoyne's other excuses for postponing the staunching project particularly convincing. He thought it inadvisable to divert funds from the two items already authorized for 1849–50, despite the fact that the entire project had "already assumed a different aspect."

This last may well have been the real reason for the delay. The "different aspect" of the matter was that the Ordnance was pressing for the trial use in one of the magazine areas of that novel substance, asphalt. By delaying the staunching project, London may well have hoped to establish the reliability of asphalt in the Halifax climate, and hence the desirability of using it to cover the casemates.

VI

The Royal Engineers began using asphalt in the late 1830s. In the following decade, they slathered it on every imaginable surface in an attempt to discover the range of its usefulness. Some of the members of the corps came to regard it as a cheap cure-all for the various minor ailments of permanent fortifications. This line of thought reached a high point, of sorts, when Colonel John Oldfield published his "Memorandum on the use of Asphalte" in the *Professional Papers* in 1852.[44] Although Oldfield ended his introduction with the warning that asphalt "should be tested in every possible way before it is extensively adopted in the service," the tone of his remarks would probably please a modern advertising copywriter. He recommended it for everything from embrasure facings to barrack floors. As staunching material, he reported, it was both cheap and reliable.

Even before Oldfield's article appeared in print, the views expressed in it were current in the upper reaches of the Ordnance. As far back as 1846, Colonel Calder had been induced to try asphalt in the magazine areas in the Citadel. Savage had apparently not been informed of this arrangement. In 1848, he brought forward a project for flagging the areas in the annual estimates for 1849–50. In London, the Surveyor of the Ordnance noticed this item, and recommended the substitution of asphalt in one of the areas. When Savage heard of the suggestion, he promptly dispatched a letter to London with his ideas about the suitability of asphalt for the purpose:

> *In a warm climate, or even a moderately cold one I am equally an advocate for asphalte as M^r^ Owen* [the surveyor]*, having seen it used with great success both at Mauritius* [?] *Gibraltar, but in Severe climates like Canada, Nova Scotia, or New Brunswick, I am of opinion it never will answer except it is well covered over, and perfectly secured from the influence of the atmosphere . . . .*
>
> *For the above reasons therefore I respectfully submit to your consideration the impropriety of its use for the services proposed.*[45]

London issued a rebuttal of these objections with surprising speed. The Assistant Inspector General (Fanshawe) annotated Savage's comments in the blank half-margin of the letter and sent it back to the colony a bare 15 days later. Fanshawe noted that the asphalt which had failed in the North American colonies had been "Bastenne Bitumen" which had proved inadequate many times, even in the English climate. The substance which was proposed for a trial in Nova Scotia was "Claridge's Patent Seyssel Asphalte," which had never previously been used in North America. Given these considerations, Colonel Savage was asked whether he had any objections to the trial.[46]

The result of all this was that Savage was induced to accept the test. A demand for stores to the amount of £179 12s. 0d. for asphalt and the accoutrements necessary for its use was drawn up and submitted to the Board of Ordnance. It was accompanied by a minute from General Burgoyne which recommended that the

> *Seyssel Asphalte Company be invited to allow an experienced brick layer of the Corps of Royal Sappers & Miners to be instructed by their workmen in the laying on, as well as mixing & heating the Material in order that he may be sent out to the Sapper Company at Halifax to perform the work according to the instructions of the Seyssel Asphalte Company so as to give the material a fair trial.*[47]

While the board was considering this proposal, the Surveyor of the Ordnance drew up two memoranda, the first dealing with Savage's reservations and questions on the subject, and the second setting forth the methods to be used in laying the material in the magazine areas.[48] On 15 May the board approved the experiment,[49] and a few days later the relevant documents were transmitted to Nova Scotia.[50]

The asphalt authorized for the experiment was, as noted above, a variety known as Claridge's Patent Seyssel Asphalte (usually simply called Seyssel asphalt). It was

> *made from a bituminous rock found at Pyrimont Seyssel in the Jura Mountains.*
>
> *It is limestone saturated with bitumen, and contains about 90 to 92 per cent carbonate of lime and 10 to 8 per cent bitumen.*
>
> *The material is ground, mixed with grit and heated mineral tar until the mass has thoroughly amalgamated and becomes reduced to a mastic. It is then run into moulds to form blocks.*
>
> *These blocks are 18 inches square, 6 inches deep, and weigh about 125 lbs. each.*[51]

The asphalt was prepared for use by heating, in the course of which additional mineral tar was added to the mixture. When it was entirely liquid it was to be spread to the desired thickness. The cost of the refined blocks in 1849 was £7 10s. 0d. per ton.[52]

From the Ordnance's point of view, Seyssel asphalt had two disadvantages. It depended on a foreign source of the raw materials and it was comparatively expensive. Since there were deposits of natural bitumen in several British colonies (notably Trinidad), it was understandable that the Inspector General should cast about for a more convenient and cheaper source of supply. Even as he drew up the documents regarding the trial of Seyssel asphalt in Halifax, Burgoyne was considering a letter from the Commanding Royal Engineer in Barbados reporting on the usefulness of Trinidad bitumen.[53] This was sufficiently favourable that the Inspector General decided to propose a trial of the Trinidad asphalt in both Nova Scotia and Bermuda to see whether or not it was suitable for use in those places.[54] After some haggling about the funding of the experiment, the Board of Ordnance agreed.[55] Shortly thereafter, the entire correspondence was forwarded to Nova Scotia, along with a covering letter in which Savage was instructed to

> *give the material referred to* [i.e., Trinidad bitumen] *the best trial both as regards composition in other ingredients, temperature of fusion & manipulation: – also on the different modes of application, whether as* [?] *on roofs, floors or tanks, or as cement for cheeks and* [?] *of embrazures, upon which Seyssel Asphalte has been successfully used in the Western District of this Country.*[56]

Whatever Savage's thoughts about this sudden intrusion of asphalting mania into his command were, they have, unfortunately, not been recorded. His immediate official reaction was one of mild pleasure. The substitution of asphalt for flagging in the estimate for the current year produced a saving in the estimate and Savage promptly asked for permission to use the surplus (£167 17s. 6d.) for other purposes.[57] But even this temporary gratification turned sour when Savage's request prompted London to question the whole set of balances on the current estimate. The expenditure during the working season failed to reflect the amounts granted in the original scheme, largely because of the alterations demanded by the Fortifications department. Savage's request for the transfer of funds, therefore, only served to make London aware of the effect of the changes, and Savage was instructed to explain the savings and excesses which would result. Even after he did so,[58] he was denied permission to use the money, and as a result, he was forced to submit his arguments for a third time in the middle of September.[59] By then the working season was nearly over, and the whole question had become largely academic.

The history of the asphalt experiment was only slightly happier. The asphalt was not finally delivered until 4 September,[60] by which time it was too late in the season for the entire area to be covered. Asphalt was, however, laid down in part of the south end of the south magazine area and was closely observed during the succeeding months. On 6 February 1850, the temperature fell below 0°F for the first time that winter, and on the following day the asphalt was observed to be cracked. By the end of the winter, the cracks had become quite numerous. Savage was disposed to continue the experiment, but was not particularly hopeful about the results:

> *I am . . . of the opinion that Asphalte in this country will never answer where there is a possibility of any water or damp getting under that is within reach of the frost, which penetrates in this country from four to five feet. – I however think that Asphalte will answer laid over Arches which cannot rise from the effect of the frost, and therefore may be tried with success on the Arches over the casemates in the Citadel.*[61]

This last sentence is important. If, as one suspects, the primary purpose of trying asphalt in the Nova Scotian climate was to induce Savage to consider it for staunching the casemates, this admission demonstrates the extent of London's success. Even without a successful demonstration of the suitability of the material, Savage was now disposed to use it.

VII

The acceptance of asphalt as a suitable substance for water-proofing necessitated major changes in Savage's 1849 estimate for staunching the dwelling casemates. Unfortunately, most of the material relating to these changes has either not survived or is unavailable in any North American repository. The detailed estimates for the changes were routinely included in the Ordnance annual estimate for 1851–52 and following years. Although the Public Archives of Canada possess the abstracts of these documents from 1851–52 onward, the full texts are unavailable. It is, as a result, difficult to find out exactly how the changes came about, and impossible to be absolutely certain about the nature of the final results.

Basically, the changes involved three main features: the structure of the dos d'ane coverings, the nature and extent of the drainage system and the nature and position of the tanks. These three interconnected changes were the result of a number of decisions, of which the adoption of asphalt was only one, albeit the most important. The process of change in design had, in fact, begun after the receipt of Savage's responses to the problems of accommodation and water supply, and had continued concurrently with the asphalt trial, although (so far as we know) no construction was actually begun until the working season of 1851–52. A tentative agreement on the final form of the staunching and water supply project was reached sometime between July and October 1849. On 28 July the Fortifications department dispatched the surveyor's definitive judgements on the 1849 estimate to Savage for comment, with instructions to include the project in the annual estimate for the ensuing year.[62] Mr. Owen, the surveyor, provided eight recommendations and questions. He recommended several changes in the composition and position of the down pipes, including the direct exposure of the pipes to the warmth of the casemates's interiors. (The original plan had been to wall them into one corner.) His major proposal, of course, concerned the substitution of asphalt for flagging on the dos d'anes and a drastic alteration in the shape of the dos d'ane covering.

Suggested that the dos d'anes be covered with Seyssel Asphalte, the interior and top of the exterior revetment to be 6 ins above the line of the terre plein or the under side of the proposed additional height above the bed of the existing coping as the case may be – be formed as asphalted Brick work – and the drains in the dos d'anes over the Springinal [sic] *walls be formed in brickwork with the joints partially open for the wet to percolate through into them . . . the mode of forming the asphalte into the hopper heads is suggested to* [sic] *by frustrum of an inverted cone formed in the brickwork, rebated in the hopper head, and the asphalte run in hot round a plug of wood fitting into the bore of the hopper head, the upper part of the plug forming the frustrum of the before mentioned inverted cone up to the sole of the asphalte gutter.*[63]

These suggestions arrived after Savage had agreed to try asphalt, but before any of the substance had actually been used. Savage made no formal reply before October, when the asphalt had been applied and was apparently a success. Savage then accepted all of the surveyor's proposals, and set about embodying the new arrangement in the annual estimate for the following year.[64] It is nearly impossible, barring the discovery of the text of the annual estimate for 1850–51, to be certain about the extent of the revised project, but in all probability it included a re-designed dos d'ane, a relocation of the down pipes and drains, and possibly a complete revision of the water supply system. At some point between 1850 and 1855, the projected storage tanks under casemate No. 50 were abandoned in favour of a more extensive system of tanks under the parade square (including one 66,000 gallon tank in each of the salients and a 30,000 gallon tank in the gorge of the redan). It is uncertain whether all these changes were made at the same time, but it seems probable.

By the spring of 1850, the results of the asphalt trial had become somewhat ambiguous, but Savage, having made his choice (or, more accurately, having been pressured into it), bravely stuck with it. But the situation had once more gotten out of his control. The whole of the staunching and drainage schemes depended on an adequate supply of asphalt, and it rapidly became apparent that the delays encountered with the first shipment in the preceding summer were to be typical of the entire operation. By midsummer, Savage was complaining that most of the Citadel items in the current annual estimate were being held up because of insufficient asphalt.[65] In the ensuing three years, complaints from Halifax about the non-receipt of asphalt supplies were to become extremely common.

Without working materials, Savage had to content himself with replying to a long list of comments from the surveyor on the subject of the failure of the asphalt in the magazine area. Owen proposed changes in the drainage of the area, suggested that the fact that only part of the area had been covered may have been responsible for the failure, and recommended that the part already done should be left another winter and another report sent on the results.[66] Savage replied, enclosing detailed suggestions on the protection of exposed asphalt from the action of frost.[67] If he had any second thoughts about the difficulties involved in the use of the material, he let none of them show in his letter.

Two months later, in October, Savage submitted the annual estimate for 1851–52.[68] This included a total of £9,013 6s. 1d. to be spent on the Citadel. London reduced the total to £6,866 8s. 3d., all of it allocated for staunching, truckage and drainage. In doing so, the Fortifications department made it abundantly clear that no more money would be granted until the staunching and water supply had finally been dealt with, which in turn made the entire Citadel project dependent on the erratic supply of asphalt.

The problems with the supply were twofold. On the one hand, London could not be counted on to dispatch a sufficient supply for any given working season; on the other, even when the supplies did arrive, they were rarely what had been asked for. On 11 October, Savage complained that almost half of the 109 tons supplied for the water tanks was coarse grade asphalt – he had ordered fine grade – and asked whether it would be permissible to use it for the purpose for which it was intended.[69] London replied at the beginning of December. After inquiries had been made of the asphalt company, the Ordnance determined that Savage was mistaken in his assessment of the asphalt delivered, and that the coarse asphalt he complained of was actually "fine grit." The surveyor enjoined the asphalt company to mark their blocks more carefully, and recommended that samples of the three available grades of Seyssel asphalt be sent out to Nova Scotia so that Savage would be able to judge the difference.[70]

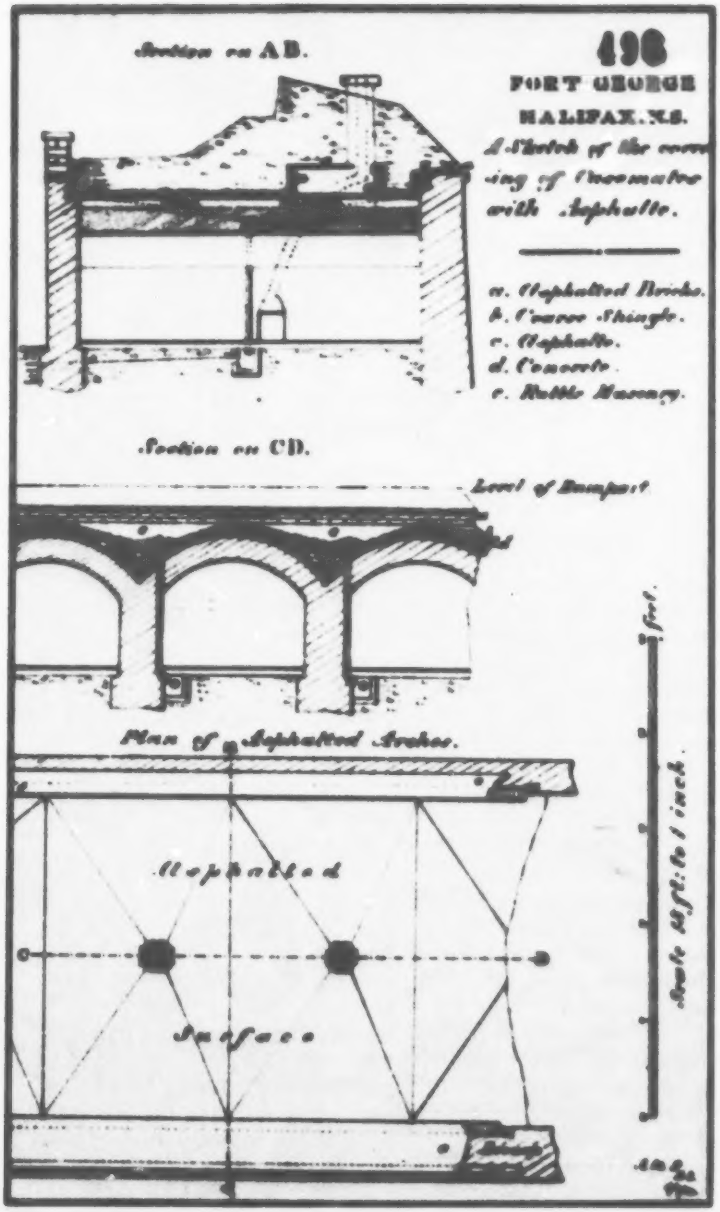
This exchange only served to illustrate Savage's comparative ignorance of the subject of commercial asphalt. The next exchange, however, was different. On Christmas Eve Savage requested that a supply of fine grit asphalt be sent as soon as possible.[71] This insistence on early delivery – the working season was five months off – served as a strong reminder of the absolute importance of a secure asphalt supply, if the work planned on the authorized items in the annual estimate was to continue.

While Savage's request was in transit to England, the supply question was complicated further by the arrival of advance notice of a shipment of Trinidad bitumen to Halifax, along with instructions on the use of the substance.[72] Whether the shipment would appreciably improve the situation or not was debatable; it faced Savage (who had demonstrated himself to be a novice in the use of asphalt) with two different types requiring different methods of preparation and application.

At the beginning of 1851, Savage inadvertently complicated an already bewildering situation by forwarding an innocent request for Portland cement for use in the staunching.[73] London, by this time, was already convinced that Savage's attitude toward asphalt was at best lukewarm, and chose to interpret the letter as a request for permission to substitute cement. Savage received a brief reply demanding clarification of this point.[74] Betraying some irritation with this absurd misinterpretation of his innocuous request, Savage countered by noting that both cement and asphalt were needed in the staunching operations, and that, in his opinion, Portland cement was superior to Roman cement for the purpose. He repeated his request for supplies of the former, and concluded with a pointed reminder that the working season was fast approaching.[75]

In the middle of all this, Savage found the time to examine the samples of the approved grade of Seyssel asphalt which had been sent out from England as a result of his complaints about the allegedly coarse grade he had received the previous autumn. He was both gratified and irritated to discover that, Mr. Owen and the asphalt company to the contrary, he had been

23 "A sketch of the covering of the Casemates with Asphalte," 1854. The plan and sections show the method of staunching finally adopted. Note that the down pipe was placed in the centre of the pier wall, and that asphalt and asphalted bricks were used extensively. (*Public Archives of Canada.*)

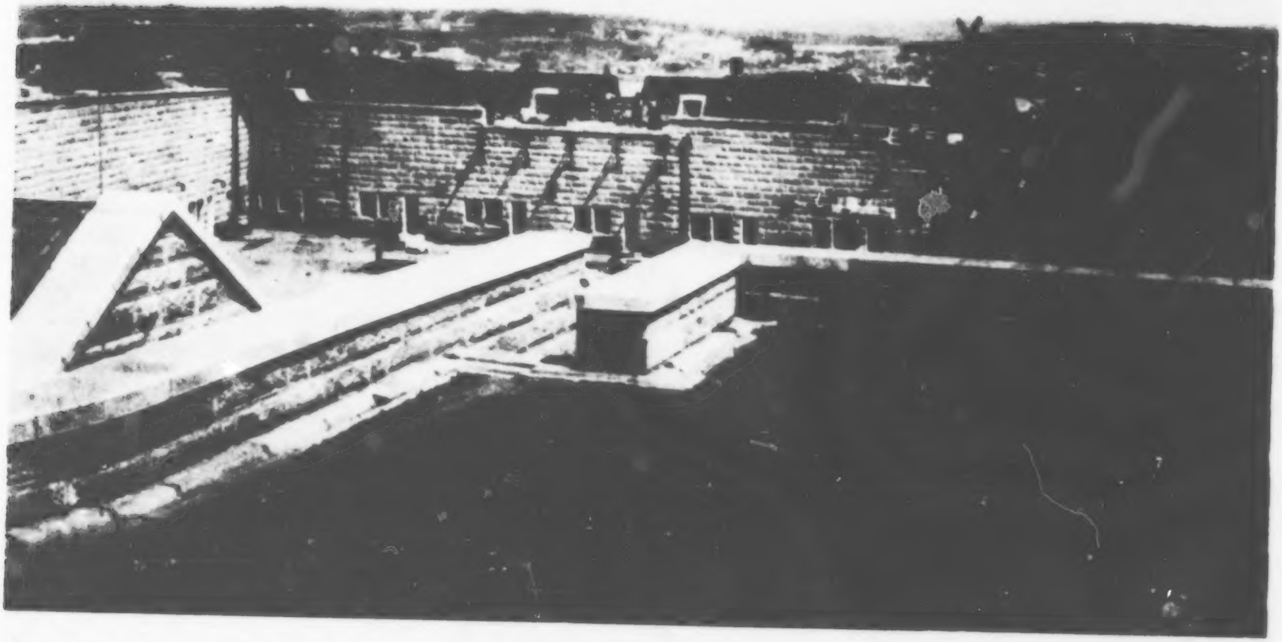

Section on AB.
498
FORT GEORGE
HALIFAX. N.S.
A Sketch of the covering of Casemates with Asphalte.
a. Asphalted Bricks.
b. Coarse Shingle.
c. Asphalte.
d. Concrete.
e. Rubble Masonry.
Section on CD.
Level of Rampart
Plan of Asphalted Arches.
Asphalted Surface
Scale 10 ft. to 1 inch.
feet.

right; the shipment he had received *was* substandard. He promptly bundled up samples of the offending asphalt and shipped them off to England so that the Inspector General could judge for himself. He accompanied the transmission with an exceedingly sarcastic letter, and concluded with the ritual plea for immediate and adequate supplies of the proper grade of asphalt.[76] London replied promptly, and promised faithfully to send the desired quantity.[77]

It was unfortunate for the long-suffering Savage that London was prompter with its promises than with its deliveries. As the working season approached, the only asphalt on hand was the Trinidad type, and since there was only half a ton of it and since it had not been authorized as a substitute for Seyssel asphalt, it was not of much use. On 1 May, Savage notified London that none of the supplies requested in the demand of stores for the ensuing working season had yet arrived.[78] Three months later, he was nearly frantic. The entire lot of supplies requested for the year were, he informed London, still at sea on board the vessel *Stag*. Worse still, the bill of lading showing the contents of the vessel had already arrived and it showed that some items had been omitted – notably 3,178 bushels of cement. Could London possibly see fit to send him all the necessary supplies before the working season ended?[79]

In spite of all these problems, Savage did manage to get some of the work done. The balance sheet

24 Photograph of the east side of the southeast salient, ca. 1880. This photograph shows some of the gargoyles and down pipes for leading the water from the surface gutter, located just behind the coping at the top of the retaining wall, to the underground pipes connected to the rain water tanks. The south rain water tank is just out of sight behind the staircase landing in the centre of the picture. Not all the water went into the tanks (note the rain barrel under the pipe to the left of the salient). In the foreground, running along behind the wall and across the stair landing, is a sample of the type of surface gutter in use.



drawn up in September showed that, despite the belated (or nonexistent) delivery of vital stores, he had somehow managed to spend £4,173 12s. 1-1/4d. of the £6,866 8s. 3d. allotted for the current year.[80] The work had progressed so much that the sums estimated for the staunching and drainage for 1852 were substantially lower than for the previous year (£3,510 compared to £6,866).[81] The job was visibly nearing completion.

The 1852 working season passed uneventfully. If there were any complaints about the quality of supplies or the lack of them, they have not survived. While it was true that only about half the available funds from the current grant were spent, the work had progressed far enough that the amounts for staunching and drainage were again halved in the estimate for the following year.[82]

The 1853 working season had a few more hitches. Once again, the major problem was non-receipt of asphalt. On 12 May, Savage transmitted an urgent request for asphalt.[83] London replied, stating that the asphalt would be shipped as soon as a suitable conveyance could be found.[84] Three months later, the shipment had still not arrived, and Savage reported that in consequence work had been halted.[85] London responded with a report that the asphalt had been shipped at the end of July.[86] In spite of all this, the work was virtually complete by mid-September. In the annual estimate for 1854–55, staunching and drainage accounted for only £420 of a total estimated expenditure of £4,037 16s. 2d.[87] In what was almost his last letter from Halifax, written after his successor, Colonel Stotherd, had arrived, Savage summed up his experience with the use of asphalt. He began on an explanatory note:

> *The works at the Citadel in staunching the Casemates having brought* [sic] *to a close, I instructed Lt. Parsons Royal Engineers, the Superintending officer in February last, to prepare a Report and sketch explanatory of the application and results of the Seyssel Asphalte in constructing a pavement in the Area round the South Magazine and in making the Casemates secure against leakage.*[88]

He went on to state that he agreed with the opinions expressed by Lieutenant Parsons in his report, adding only that he personally believed that asphalt

> *of whatever kind will not endure in a climate such as that of Nova Scotia unless it is protected by a covering of earth not less than 3 feet in depth, or otherwise situated so as to be out of reach of the extremes of heat and frost.*

He concluded with comments on the bad condition of the cavalier and the folly of using asphalt as a cure-all for the ills of a decaying building.

Lieutenant Parsons' report summarized the uses to which asphalt had been put since 1849. He noted that, in the period 1849–53, the Engineer department had used 478 tons of Seyssel asphalt. The results of the experiment had been mixed. The asphalt used in the magazine area had failed every winter as a result of frost. Similarly, the asphalted brickwork on the interior slope of the cavalier parapet had failed. From this he concluded, as Savage had done almost from the beginning, that asphalt was unsuited to the Nova Scotia climate unless it was protected from the elements.

The first experiments with asphalt for waterproofing had also been failures.

> *Two of the first casemates asphalted and covered with earth were found to have leaks where the arches butted against the interior retaining wall. – on examination the fillet in connection with the wall was found to have parted from it, although grooves had been cut in the stone to receive it.*[89]

When this fault was discovered,

> *The use of fillet was then discontinued. Asphalted Bricks being built upon the 3/4"* [asphalt] *covering of the arch until a joint in the Ashlar masonry was reached, when the upper stones being removed, a coat of Asphalte . . . was carried well into the thickness of the wall. – This practice was continued throughout the remainder of the Casemates, and these from being uninhabited on account of the water coming in streams through the Arches, are since the application of the Asphalte perfectly dry and are now occupied by Officers and soldiers.*[90]

Nor was this the only success. In all three water tanks

> *the groined invert at the bottom* [was] *floated over with Asphalte, fine quality, 3/4" thick laid in two coats 3/8" thick; the wall* [was] *lined with Asphalted bricks, and the dos d'anes* [were] *asphalted 3/8" thick with fillet over the joint. . . . . These three Tanks have been found free from external leakage, and are perfectly water tight. . . .* [nor] *has the water in them been apparently affected in any way by the Asphalt.*[91]

On the whole, both Savage and Parsons felt that the experiment had been a success. Their conclusion was premature. Within six months, the problem would return to plague Savage's successor.

". . . and keep your powder dry!"

From ***Ballads of Ireland, Col. Oliver's Advice.*** *Valentine Blacker*

I

The attempts to staunch the casemates absorbed most of the energies of the engineering staff at Halifax during the last decade of the Citadel's construction. The problem involved was fundamentally the result of four different but related factors. The first was the necessity of completing the casemates in such a way as to allow them to perform their allotted functions effectively. This was vastly complicated by the second factor: pressure from the military authorities to use them as barracks. The third factor, in some ways the most frustrating, was the age of the work. A good many of the casemates had been standing empty for years before the construction finally reached a stage where they could be put to use, with the natural result that the process of staunching involved both building and repairing simultaneously. The fourth factor was the inadequacy of the original design. This was less because of incompetence on the part of Colonels Jones and Calder; the casemates were of comparable quality to those built elsewhere. But no one knew precisely what features could be used effectively in a permanent fortification in the damp Halifax climate.

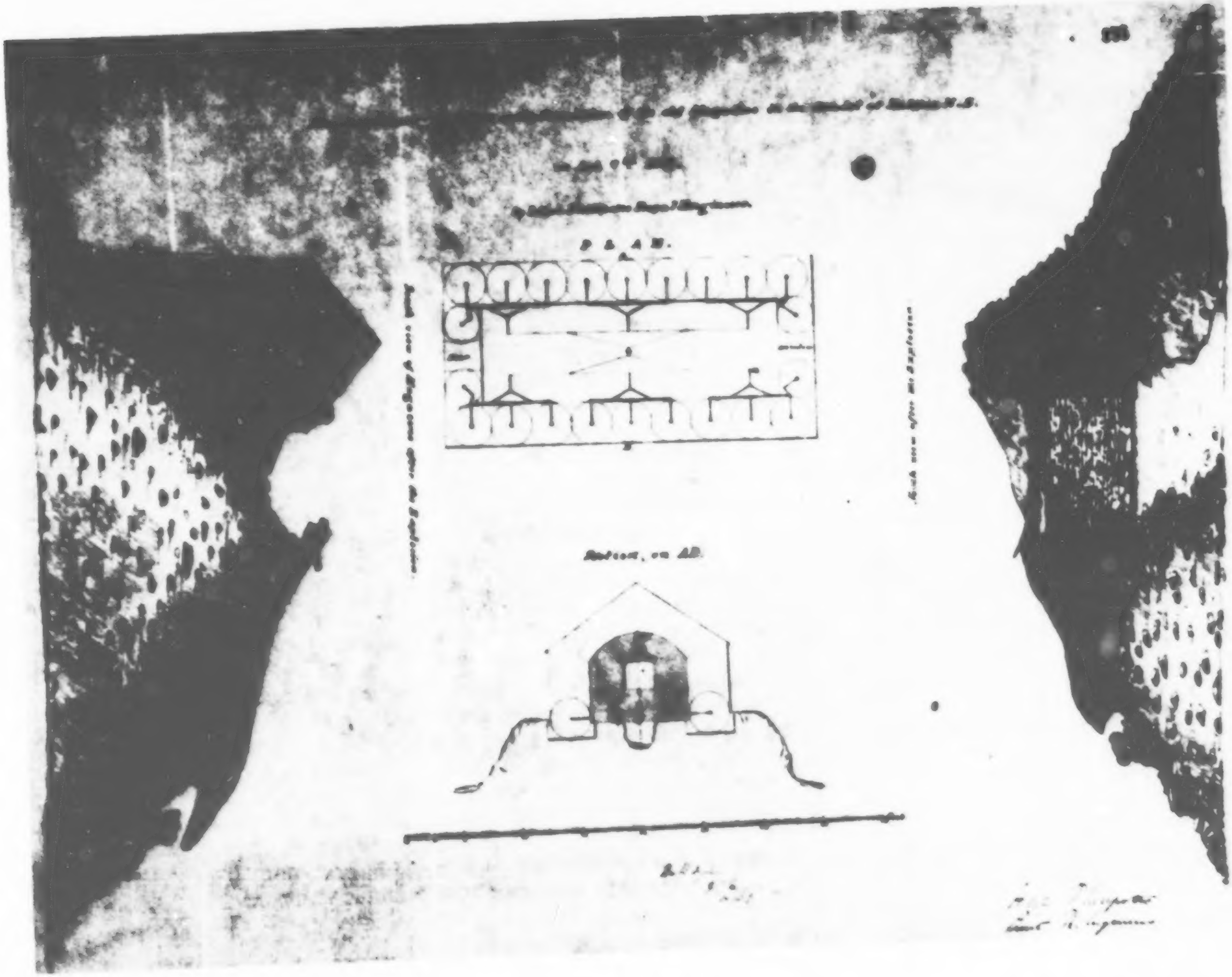
These same four factors underlay the difficulties experienced with other parts of the work carried on at the same time as the staunching. The problem of waterproofing, moreover, ultimately affected almost all the other parts of the fortress. While the casemates remained unfinished, the ramparts, armament and parade ground could not be completed; the magazines could not be used except as storage depots for other works in the Halifax area, and the glacis could not be built. There was simply not enough labour to do all the work at once. This inevitably exacerbated the age factor, since the longer the remainder of the work was postponed, the more decrepit the existing buildings became. In the end the engineers found themselves caught in a kind of nightmarish race to get the fortress finished before its aging fabric went irretrievably rotten.

The last decade of construction was, therefore, characterized by interconnected routine work, with the dominant theme of casemate staunching played out against a counterpoint of increasing urgency. The period can be divided into three phases. In the first, lasting until about 1850, the momentum of building continued, all the while being gradually slowed and interrupted by the growing demands of the waterproofing problem. At this time the final provisions of the revised estimate were carried out and the last attempt was made to introduce new features into the original plan. By the end of this stage, it was obvious that the primary concern was not improving the work but preserving what had already been built. In the second phase, lasting from 1850 to about 1854, the waterproofing brought almost all other work to a complete standstill, while the decay of the older portions of the masonry was accelerated. In the third phase, from 1854 to 1856, all the problems, delays and faulty judgements of the previous quarter-century finally came home to roost, and the project came closer to foundering completely than it had at any point since the early 1830s.

The most characteristic activities of the first phase were the removal of earlier failed work and the abortive attempt to introduce prison casemates; of the second, the attempt to install the armament. The third phase was characterized by an almost frantic attempt to renew, restore or rebuild parts of almost all the major components of the fortress, including the cavalier and magazines. Even the casemates, after almost 10 years of continuous labour on the problem of waterproofing, remained a major source of worry and complaint. In the end, disaster was averted, but it had been (to use a Wellingtonian phrase) "a near run thing."

II

By the mid-1840s, one of the few remaining routine tasks which did *not* involve the casemates was correcting earlier mistakes and removing those features of the early design no longer felt to be necessary. The first casualty was the old (1812) magazine, which had been standing empty for 19 years and obviously impeded the completion of the parade square. In the spring of 1847, Calder got permission to remove it. As it was an almost embarrassingly solid piece of work, 25 "Plan to accompany the Report on the Demolition of the old Magazine," 1847. (*Public Archives of Canada.*)


PLAN.
South view of Magazine after the Explosion
North view after the Explosion
Section, on AB.

the Fortifications department did not want to spend the time and effort necessary to demolish it by conventional means. The only alternative was to blow it up, and even this took considerable time. Between 24 March and 6 April, working parties laboured with crowbars, picks and sledge hammers on the business of constructing galleries in the masonry walls for the gunpowder charges. In all, 22 chambers were cut into the walls and were packed with charges of between 9 and 16 pounds of gunpowder each.

On 7 April, everything was ready. The officer in charge of the demolition described the results.

The charges being fired, the foundations were blown away, the walls rose about 3 feet, and falling with a low rumbling sound, crumbled to pieces, hardly two stones being left together. Not a stone was blown 50 yards from the building.

The arch, of course, fell in; all the charges exploded except the four in the North Angle which was consequently left standing . . . .

The demolition was most complete, and the magazine now presents the appearance of a shapeless mass of ruins.[1]

Colonel Calder pronounced himself pleased with the operation. Indeed, he was so impressed with the speed and efficiency of the demolition that he proposed similar measures for one of the other failures earmarked for removal.

I beg to propose the removal of the West Ravelin (which is to be taken down and rebuilt) by a similar process, but for this I consider it necessary to obtain your [Burgoyne's] *sanction, as to effect it about 20 barrels of gunpowder will be required, an expense which will be amply covered by the diminution of labour.*[2]

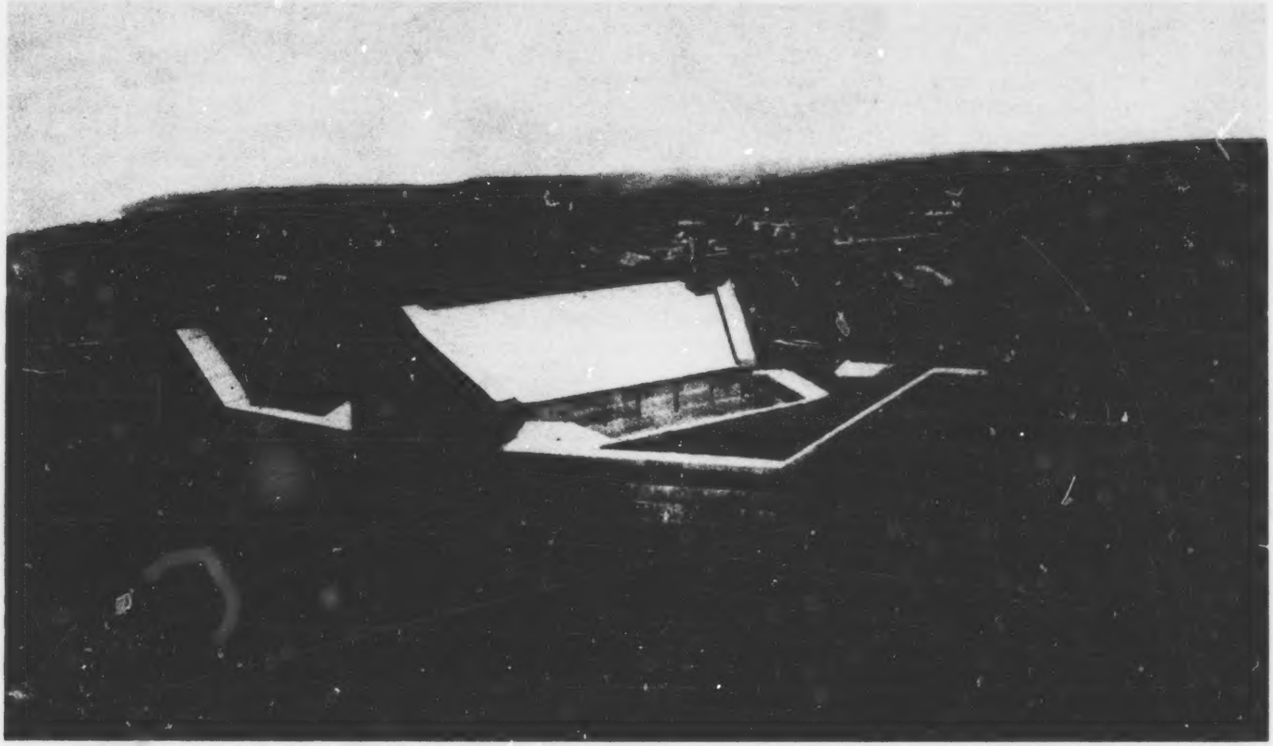
Calder waited almost a year for a reply to this proposal. When it finally became important to get the matter settled so that he could proceed with the rebuilding of the ravelin, he dispatched an informal query to London. "Col. Calder presents his compliments to the Inspector General of Fortifications and begs to acquaint him that the last paragraph of his letter No 193 . . . has not been replied to."[3] The fact was that London had lost the original letter; one of the clerks had to annotate the margin of Calder's query, "I cannot put my hands upon the orig^{l} letter No 193."[4] When it was finally found, the Inspector General responded by asking Calder why he wanted to proceed with the scheme. Calder restated his reasons.[5] After another delay, Burgoyne decided to forbid the use of explosives in the demolition on the grounds that it might be possible to re-use some of the stone from the west ravelin in rebuilding.[6]

This ended the brief vogue for dramatic demolition of old mistakes. In fact, apart from the two cases mentioned above, a surprisingly small amount of the supposedly defective work of the early period was ever altered. Most of the work in question was, of course, in the escarp walls, and some of the basic rebuilding and repairs there had already been done by Nicolls and Boteler in 1831–32. Colonel Jones estimated in 1834–36 that only 574 feet of the remaining old walls would have to be rebuilt.[7] This was only a portion of the original escarp and it was demolished by means less dramatic than explosives. In the end the engineers made do with the remaining old walls, partly because the masonry in question, though shoddily built, showed a complete disinclination to collapse. After the demolition of the west ravelin in 1848–50, the whole question of the old work was shunted aside and partly forgotten. It was not until 1855 and under rather different circumstances that it became again an issue.

III

As the last of the old work was being removed, Colonel Calder made the last attempt to introduce a new feature into the overall design of the Citadel. This was in response to a peculiar and specific sort of accommodation problem. The first soldiers to have the honour of inhabiting the Halifax Citadel had been the military convicts. As early as 1845, a strongroom and guardhouse had been fitted up for prisoners in two of the defence casemates (Nos. 54 and 55).[8] This was apparently only a temporary arrangement to serve until cells designed

26 The west ravelin rearmament, ca. 1875. The rearmament of the ravelin consisted of cutting an embrasure at the salient and removing one embrasure from each face.



for the purpose could be built. Such cells were included in the 1843 estimate for alterations and renewals and were to be located above the end casemates of the cavalier.[9] But even after the cells were built, there was still not enough room for the convicts. On 7 August 1847, Calder submitted a proposal for 12 more cells to be placed under the ramparts on the south side of the southeast salient.[10] His design called for a complicated arrangement of two-storey arched compartments connected by a corridor at the rear. He estimated the total cost of the scheme at £2,410 19s. 7-1/2d.[11]

London not only approved the scheme but, in a rare burst of generosity, actually enlarged upon it. Calder shortly received a revised design which included two additional compartments for first-class prisoners and a more complicated system of heating and ventilation. The only objection which the Ordnance raised was to the proposed location of the new work. The south face of the southeast salient was considered inappropriate because of the lack of space available for the enlarged scheme, so it was suggested that the work should be put on the east side of the salient.[12]

Calder, doubtless amazed at this unexpected development, could only concur. He incorporated all the changes and re-submitted the design on 15 November.[13] Even as he was doing so, however, London was having second thoughts about the whole project. The problem of accommodating prisoners was

Table 4. Proposed Armament, 1846*

Location	Guns				Mortars		Howitzers
	8-in., 9'0"	32-pr., 9'6"	32-pr., 6'6"	24-pr., 6'0"	13-in.	8-in.	8-in.
South front		3					
West front		6	2			4	
North front		4			2		4
East front		8				4	
Salients, all fronts	5†					2	4
North ravelin			6				
South ravelin			6				
West ravelin			4				
Salients, all ravelins		3†					
Cavalier		7					
Casemates				20			
Total	5	31	18	20	2	10	8

*Adapted from a return in PAC, MG12, WO55, Vol. 880, p. 913.
†One in each salient.

essentially an army matter, and the Ordnance had seen fit to submit the scheme to the Secretary at War for an opinion. The secretary, Mr. Fox Maule, disliked the idea and decided that it would be better policy to build a gaol large enough to hold all the garrison convicts somewhere outside the Citadel.[14] The Board of Ordnance accepted the recommendation and instructed Burgoyne to inform Calder.[15] In the end, the cells over the cavalier cookhouse remained the only military prison within the fortress.

IV

It was not until 1846 that the Ordnance staff in Halifax addressed themselves to the task of composing an armament proposal for the Citadel. In that year, Lieutenant Colonels Calder and Jackson (the CRA) drew up a scheme which entailed 94 pieces of ordnance, including five 8-inch guns, thirty-one long 32-pounders, eighteen short 32-pounders, twenty 24-pounders, twelve mortars and eight howitzers (*see* Table 4).[16] On 15 September 1846 the Director General of Artillery approved the plan and initiated the process of installation.[17] Almost ten years elapsed before the bulk of the armament was installed.

The first stage of the process involved the manufacture of carriages for the guns, the acquisition of the guns themselves, and the construction of the stone platforms on which the greater part of them would be mounted. The first matter was the responsibility of the Royal Carriage Department; the second, of the Board of Ordnance, and the third, of the Engineer department in Halifax. Since a coordinated interdepartmental effort was involved, delay and complications were inevitable, and it was well over two years before all the orders were filled.

The most serious misunderstanding arose over the order for 24 siege gun platforms after Lieutenant Colonel Alderson's pattern. These were intended for mounting the mortars, howitzers and four of the 32-pounders.[18] The Ordnance staff in Halifax included them in the order for traversing platforms and carriages sent in to the Carriage department in the spring of 1847.[19] Two years later the Carriage department decided that the platforms might not be their responsibility. The gentleman in charge, Mr. Gordon, wrote to General Burgoyne.

> *I feel assured you will excuse my addressing you point blank (as the saying is) upon the enclosed order for Halifax.*
>
> *I made inquiry from the Assistant Director General of Artillery thereon, and he gives me the dates and authorities only, but I want measurements or working plans and I am sensible you will afford me such as to enable me to carry out this outstanding order.*[20]

After some discussion, the Board of Ordnance decided that the Carriage department ought to be relieved of the task of making the platforms, and instructed Burgoyne to ask the Commanding Royal Engineer in Halifax why they had not been included in the Engineer Demand of Stores in the first place.[21]

By the time this finally got back to Halifax, Colonel Savage had replaced Calder as Commanding Royal Engineer. Savage had no idea why his predecessor had requested the platforms from the Carriage department, and could only promise to include them in the Ordnance annual estimate as required.[22] By then it was obvious that the armament could not be mounted at all until the problems of waterproofing the casemates were solved, and the whole question of equipment was temporarily sidetracked. Fortunately, the Artillery was in no hurry to mount the guns and, except for the occasional enquiry on technical matters, nothing more was heard about armament for two years.

By the spring of 1851, however, the Director General of Artillery was beginning to get impatient. The CRA was requested to report on "the condition of the fort with respect to its state of preparation for mounting the Ordnance."[23] The CRA relayed the request to Colonel Savage,[24] who answered that the Citadel would not be in any state to receive armament until the summer of 1853. Even this date proved optimistic. When the question was put to him again in January 1853,[25] Savage was able to approve the mounting of only part of the armament for the following summer.

> [The] *following description & number of Guns may be mounted . . . viz:*
>
> *5–8 inch – 9' 0" long at Salient angles. – 10–32*^{pr} *– 9 . . 6 –" on Cavalier & Ravelin – 20–24d° – 6 . . 0 –" – In Casemates – 16–32d° – 6 . . 6 –" – Ravelins.*[26]

The remainder could not, he thought, be mounted until the following year.

The Ordnance did its best to prevent Savage from carrying out his plans for 1854. The mounting of armament on the rest of the work depended on the completion of the staunching project and the construction of the ramparts and terreplein. While the former appeared to be going ahead successfully, London prevented the latter by refusing to allow Savage the sum provided for the service in the annual estimate for 1853–54. Three months after he had given his optimistic prediction to the CRA, Savage wrote to the Inspector General proposing that the funds allotted for completing the glacis be used instead for the terreplein and parade.[27] London replied with surprising speed, granting permission to make the substitution.[28] Since the work was not included in the annual estimate for the following year,[29] it would seem that the ramparts were constructed in the summer of 1853, and, in all likelihood, most of the rest of the armament was mounted the following summer.

Whether it would stay mounted was another matter. By the fall of 1854, serious questions were being raised about the future of the cavalier, and after a brief period of optimism, it was becoming depressingly evident that the casemates were still displaying a pronounced tendency to leak.

V

The first indication that parts of the Citadel were falling to pieces came on 19 October 1852, when the Ordnance Storekeeper, Mr. Ince, discovered that the door of the north magazine would not open "in consequence of something having fallen against it."[30] On examination, Colonel Savage discovered (probably to his horror) that "the floor, which was previously in a decayed state, had suddenly given way, from the weight of the powder and the decay of the joists."[31] Savage had already provided for repairing the floor in the annual estimate for the following year, but the sudden collapse took him by surprise, and he could no longer wait for the estimate to be authorized. He therefore requested that the Respective

Officers formally propose a special estimate. The Respective Officers replied three days later:

> *We have to request you will immediately take the necessary steps to bring the subject under the notice of the Inspector General of Fortifications with a view to obtain as soon as possible the Master General and Board's authority for the repair of the floor for the preservation of the powder.*[32]

The next day, Savage formally requested permission to make immediate repairs, stating that the expense could be defrayed from the savings on various items of the annual estimate for the preceding year.[33] London was quick to authorize the expenditure, and the repairs were carried out in the course of the winter.[34]

In spite of his experience with the north magazine, Savage was somewhat startled when, a few months later, he examined the floor of the south magazine while alterations to the powder bays were being made:

> *I was led from the appearance of a depression in the surface of the floor, to examine its state beneath . . . it was found that the joists, plates and boarding throughout were in the last stage of decay, evidently from the same cause that rendered necessary the renewal of the floor of the north Magazine, and which makes it absolutely necessary to renew this floor before the bays can be arranged or the powder again stored therein.*[35]

This discovery made it necessary to formulate yet another special estimate, but this time Savage decided to use a new method of repairing the floor. Acting on a suggestion from the Surveyor of the Ordnance, he proposed to use

> *fine Seyssel Asphalte without grit in lieu of the joists and planking, which substitution I consider may be effected as an experiment, as it is probable that asphalte in this situation, not being exposed to the direct action of the weather it* [sic] *may be found to answer to the desired end.*[36]

He enclosed a special estimate and a demand for stores amounting to £158 5s. 0d.

Despite the fact that Savage's suggestion was made at the height of the asphalt mania, London decided that it would not be appropriate to use the material on the magazine floor. General Burgoyne recommended that the floor be repaired in the same way as the one in the north magazine (apparently with a new wooden floor) and the board approved his recommendation.[37]

The two magazine floors were repaired and the buildings restored to normal use by the summer of 1853. There followed a brief respite. It was to be a year and a half before the next serious problem arose.

VI

By the fall of 1853, Colonel Savage thought that the end of the Citadel construction was in sight. The Ordnance annual estimate for the following year reflected this belief. There were only two items in it for the Citadel.[38] One, amounting to £2,681 12s. 3d., was for the completion of the glacis and parade square, and this was believed to be the last major expenditure on the work. The Assistant Inspector General wrote, in forwarding the estimate to the board, "With the sum here proposed the Comm^{g} R^{l} Engineer expects to complete the Citadel in 1854–5."[39]

The second Citadel item for £1,256 2s. 11d. was for the renewal of the cavalier colonnade and was considered absolutely necessary for the occupation of the building by troops. This was an ominously large sum to be spent on repairs, but it could easily be explained. After all, the cavalier was almost 25 years old and repairs were a matter of routine in a building that age. At this point, no one seriously considered more drastic measures to be necessary.

This mood of optimism lasted for some time. In February, Lieutenant Parsons drew up his memorandum on the effectiveness of asphalt in the Citadel; while he admitted that it had not worked in the case of the cavalier, he did not speculate on the reasons.[40] In forwarding Parsons' report to London, Savage noted that

> *the very imperfect state of the Escarp and Retaining walls of the Cavalier erected many years since, render any attempts to secure it against leakage short of rebuilding the upper part of it, a measure of considerable difficulty, if not an impossibility.*[41]

Apart from this observation, which Savage appended almost as an afterthought to a long report, the whole question of the cavalier's suitability received little attention either in Halifax or in London.

When Lieutenant Colonel Richard Stotherd inherited Savage's command in June 1854, it seemed that he would have the good luck to be the first Commanding Royal Engineer in more than a quarter-century to avoid trouble with the Citadel. His first summer, in fact, passed quietly enough. The only matter concerning the Citadel which needed particular attention involved a special estimate (amounting to £22 12s. 10d.) which provided for altering the position of the stoves in the cavalier to keep the casemates warm in winter.[42] This was approved by London in just over a month.[43] Stotherd's first annual estimate, dispatched on 25 September, asked for only £1,902 for the Citadel, most of it for completing the glacis. Only £100 was for staunching the casemates and there were no items at all for repairing the cavalier.[44]

But during the winter of 1854–55, two events occurred which shattered the satisfaction of the Ordnance staff in Halifax, at least in regard to the Citadel, and Colonel Stotherd found himself faced with the worst crisis in the fortress's history since Colonel Nicolls's walls collapsed in 1830.

The first event was a systematic examination of the casemates in November 1854. This revealed that, despite all the measures undertaken in the preceding eight years, 21 of the casemates were to some degree damp. The extent of the problem varied from casemate to casemate. Some were only slightly wet; others were uninhabitable. The rampart casemates, however, were in relatively good condition compared to those in the cavalier. Except for the small end casemates and the rooms over them, the entire building was completely uninhabitable.

A very considerable extent of dampness is observable in the upper rooms and which penetrates for the most part to the lower floor . . . . The dampness arises chiefly from the very defective masonry of the escarp and retaining walls which admit the wet through the joints so as to penetrate beneath the asphalte. Owing to the frost of last winter, there is reason to believe that the Asphalte is considerably injured beneath the earth of the Terreplein.[45]

Stotherd reported all this to London in a rather gloomy letter. He was particularly dissatisfied with the cavalier.

It is now evident that a very considerable expense will have to be incurred to make the building water tight and habitable, apparently owing to the defective nature of the masonry in the external walls . . . . such is the state of the walls that it is considered doubtful whether the firing of the heavy ordnance mounted thereon would not shake the walls considerably or possibly bring them down.[46]

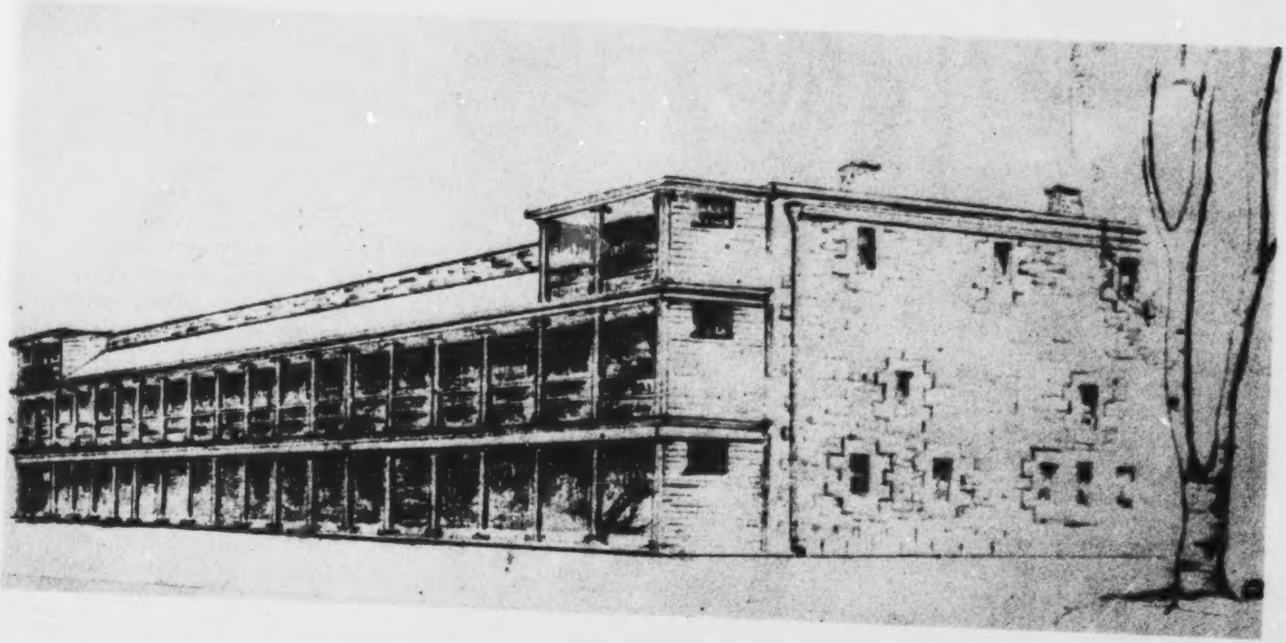
As for the ramparts casemates,

I regret to inform you [Burgoyne], *notwithstanding the hopes entertained by my Predecessor that the approved application of Seyssel Asphalte would be successful in securing them against leakage, that some of them have recently become damp from the percolation of water through the Arches; – whether this arises from Cracks caused by the frost during the previous winter, or from fractures in the coating arising from the pressure of the overlaying shingle and earth, aided by the heavy traffic in getting up and mounting the platforms and guns, it is impossible to determine without opening the ground which at this season cannot be effected owing to the frost.*[47]

He estimated that complete repairs would cost around £5,000, most of which would be needed to repair the cavalier, where he proposed to rebuild the entire top of the building from the springing of the arches up. He was less explicit about dealing with the leakage in the rampart casemates, but apparently he contemplated a continuation of the existing system of staunching.

Two weeks later, Stotherd dispatched a second letter requesting an immediate delivery of asphalt so that work on the casemates and cavalier could begin as soon as practicable in the spring.[48] The response was surprising. After nearly 10 years of experimenting with asphalt in the Citadel, the Fortifications department was beginning to wonder whether it was, in fact, entirely suitable for waterproofing in the Halifax climate. The Assistant Inspector General, Colonel George Judd Harding, wrote back, enquiring whether "flat tiles laid in cement" would not be more suitable.[49] One wonders whether Harding was aware that his sugges-

:7 A modern impression of the appearance of the cavalier prior to the installation of the permanent roof in the summer of 1855.



tion had been tried before, with indifferent results, by Colonel Jones more than 10 years earlier.

Before Stotherd even got Harding's suggestion, the second, disastrous event occurred. On 8 February 1855 Halifax experienced one of its very rare earthquakes, and among the most vulnerable buildings in the entire city was the aged, decrepit and top-heavy cavalier. The report on the damage, submitted by the Clerk of the Works and two of the junior engineer officers, Captains Philip Barry and Henry Grain, was possibly the most pessimistic summary ever produced in the entire course of the Citadel's construction.

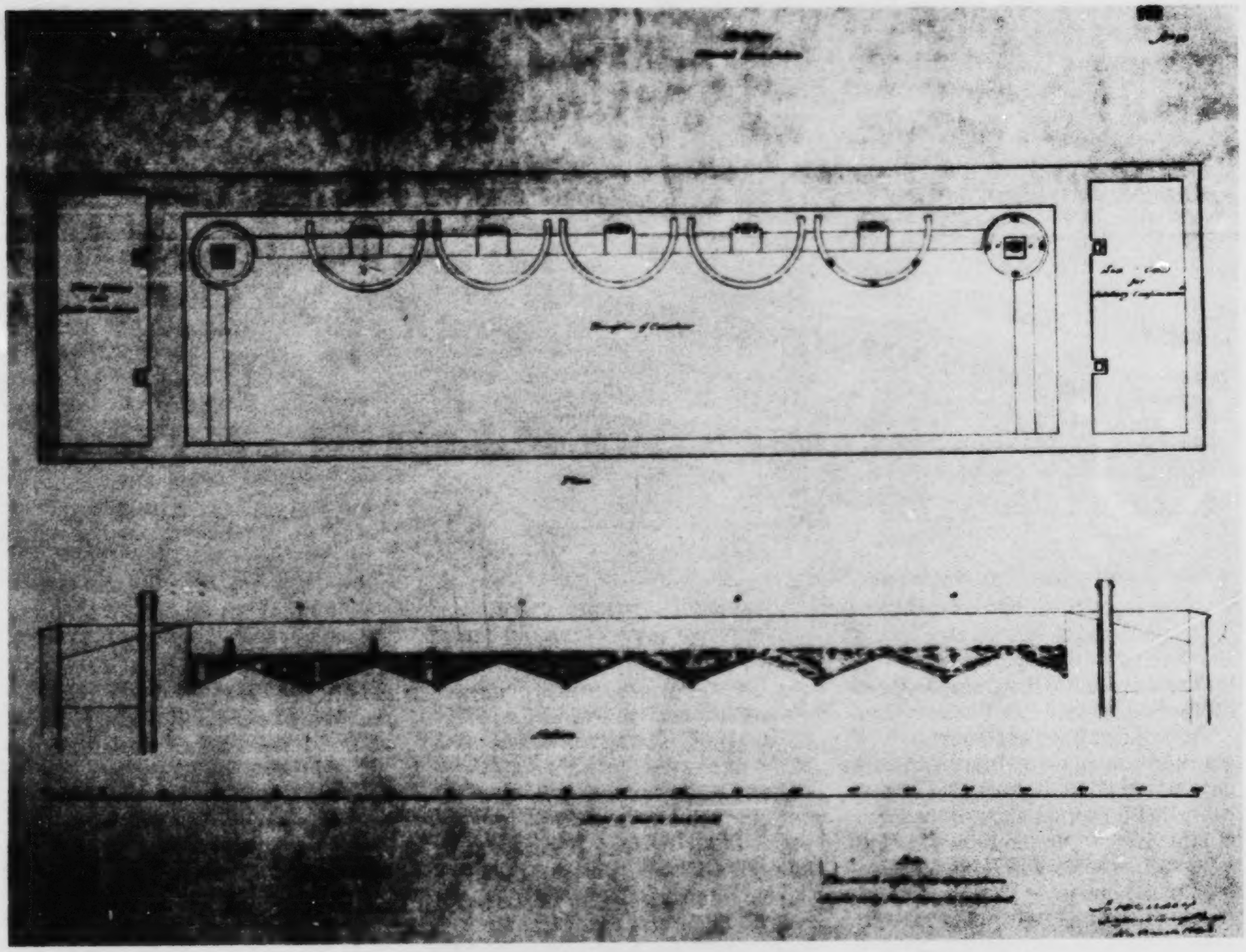
> *We are of opinion from the vast quantities of water discharged through the arches and walls* [of the cavalier] *during the heavy rains of the past week, that the shock must have, to some extent, contributed to the further disturbance of the masonry so as to increase the leakage . . . .*
>
> *The external walls appear, to a very considerable extent, to be splitting or separating longitudinally through the centre from top to bottom, owing to the expansive action of the frost on the moisture in the masonry, and which under present circumstances there is no possibility of preventing, nor does it appear to us, that there is any mode of repairing, at a future period, those defects, short of taking down and rebuilding the whole of the external walls, as no pinning or pointing would avail to render them secure in the event of a recurrence of Earthquake, much less to bear the concussion from discharging the guns at present placed on top.*[50]

They concluded by recommending that no attempt be made to staunch the arches while the walls were "in a condition apparently so irremidiable [*sic*]."

A second report, appended by Captains Barry and Grain, was if possible even more outspoken than the first:

> *We . . . would beg to suggest, that in a Military point of view it may be well to take into consideration the*

28 "Plan and Section of the top of the Cavalier showing [*sic*] the proposed Arrangement of Seven Guns also the Flagging and Counterflagging of Arches over the Existing Tiles," 1846. The flagging and counterflagging detailed in this plan were ultimately superseded other materials (most notably asphalt), but the curbs, pivots and racers were installed as shown here. *(Public Archives of Canada.)*



value of the Cavalier as a work of defence. – To us it appears not to be well calculated for its object in that particular, its greatest advantage is that of affording quarters for troops, and therefore, and as the escarp of the curtain of the West front is fast approaching a state of delapidation, which must in a few years make its reconstruction absolutely necessary, it may be worth while to consider the propriety of constructing casemates under the ramparts to afford the requisite accommodation.[51]

The two officers then went on to suggest that the cavalier be demolished to make way for "a tower . . . to mount three or four heavy guns" which would both fulfill all the military functions of the cavalier and allow more space in the fort's interior.

This second report was not only outspoken, it was downright dangerous. In a mere half-page, two junior officers had managed to question the wisdom of the original designers of the Citadel, revive an idea which had been forgotten for nearly 30 years, and, worst of all, raise the whole question of the old remaining contract masonry which had been often condemned but never replaced. One can imagine Stotherd's reaction when he read it. It was beginning to look as if the major work in his command was about to disintegrate.

In forwarding the reports on the earthquake damage to London, Stotherd adopted a cautious, almost contradictory stand on the suggestions contained in them. He began by confessing that, since it was his first winter in Nova Scotia, he was far from being an expert on the effects of the local climate. He then went on to state that, in its present condition, he could not recommend the staunching of the upper parts of the cavalier. But he was uncertain about the best course to adopt.

The proposition of Captains Barry and Grain . . . to form Casemates under the Curtain of the west front, with a tower in the centre, in lieu of the Cavalier is worthy of consideration, for the reasons they adduce, and I shall await your instructions to have it regularly brought forward with Plans &c –

On the other hand, he noted that the cavalier had once been

a very useful building, and I am strongly of the opinion that it should revert to that state and be made available for shelter for troops, and for stores, by covering it with a wooden roof similar to that which I understand existed prior to the attempt to secure the arches from leakage.[52]

Such a roof would, he estimated, cost around £600.

The Ordnance was not disposed to accept any radical suggestions. In fact, the whole apparatus of the Ordnance department was under tremendous strain because of the Crimean War, and the department was to undergo a major revolution in the near future. The officials in London, uncertain about their own futures, were not about to make major decisions. Their only response to Stotherd's letter and the gloomy reports it enclosed was a brief note asking whether it was necessary to restore or replace the building at all. No mention was made of the possibility of tearing the cavalier down, and Stotherd was requested to report on the "extent of the repairs required" so provision could be made for them in the annual estimate for the following year.[53]

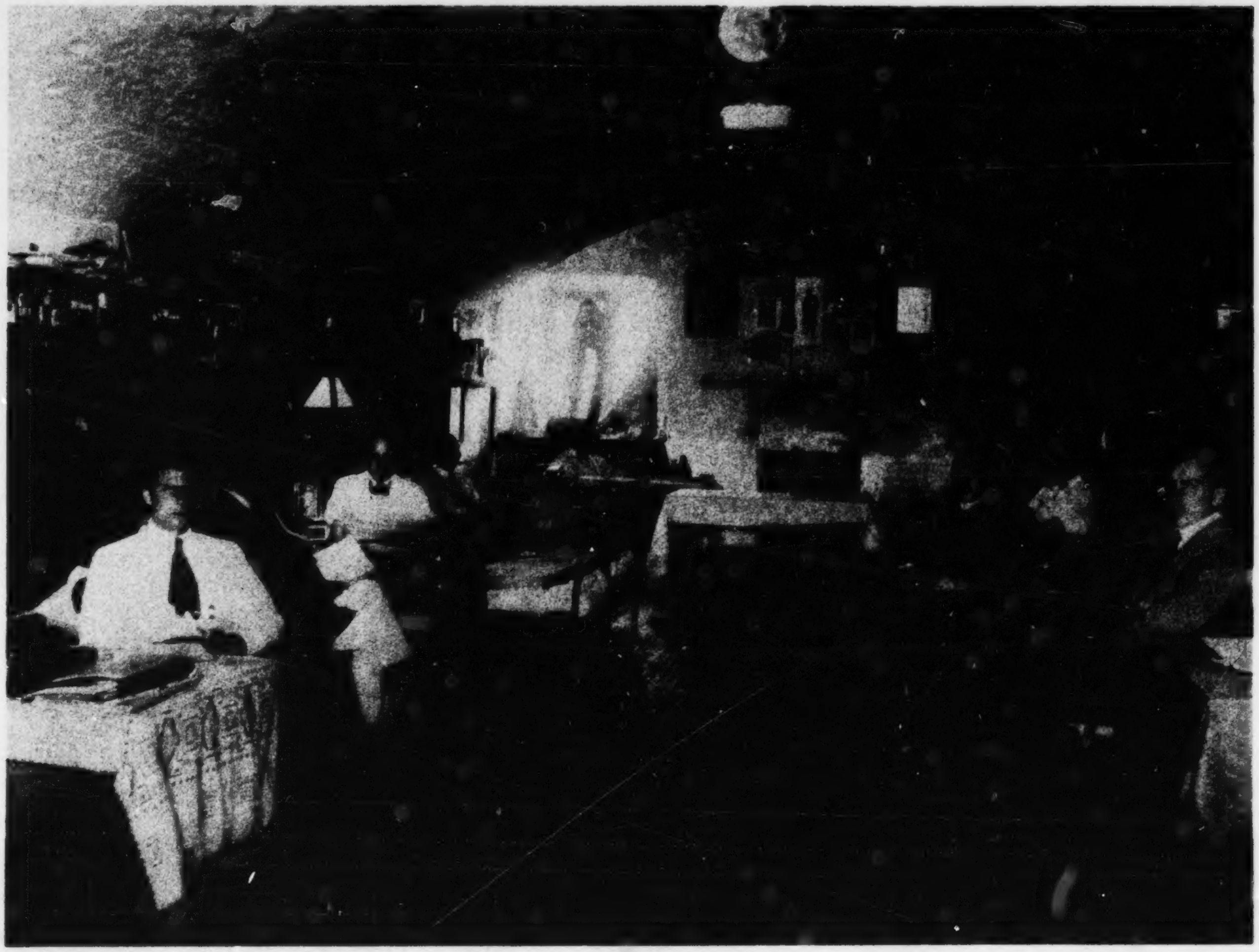
This was virtually the last instance of the Board of Ordnance handing down a decision on matters relating to the Citadel. Appropriately enough the board ended its superintendance of the work on a note of administrative equivocation. Stotherd was enjoined to await events.

He did not have to wait long; events were quick to catch up with him. He was soon facing both a political challenge from forces which had never before had any effective control over Ordnance works, and the pressures of providing necessary services within the Citadel. The first of these, which was to be the most difficult to manage, will be discussed later. The second was to shape the concluding stages of the construction of the work.

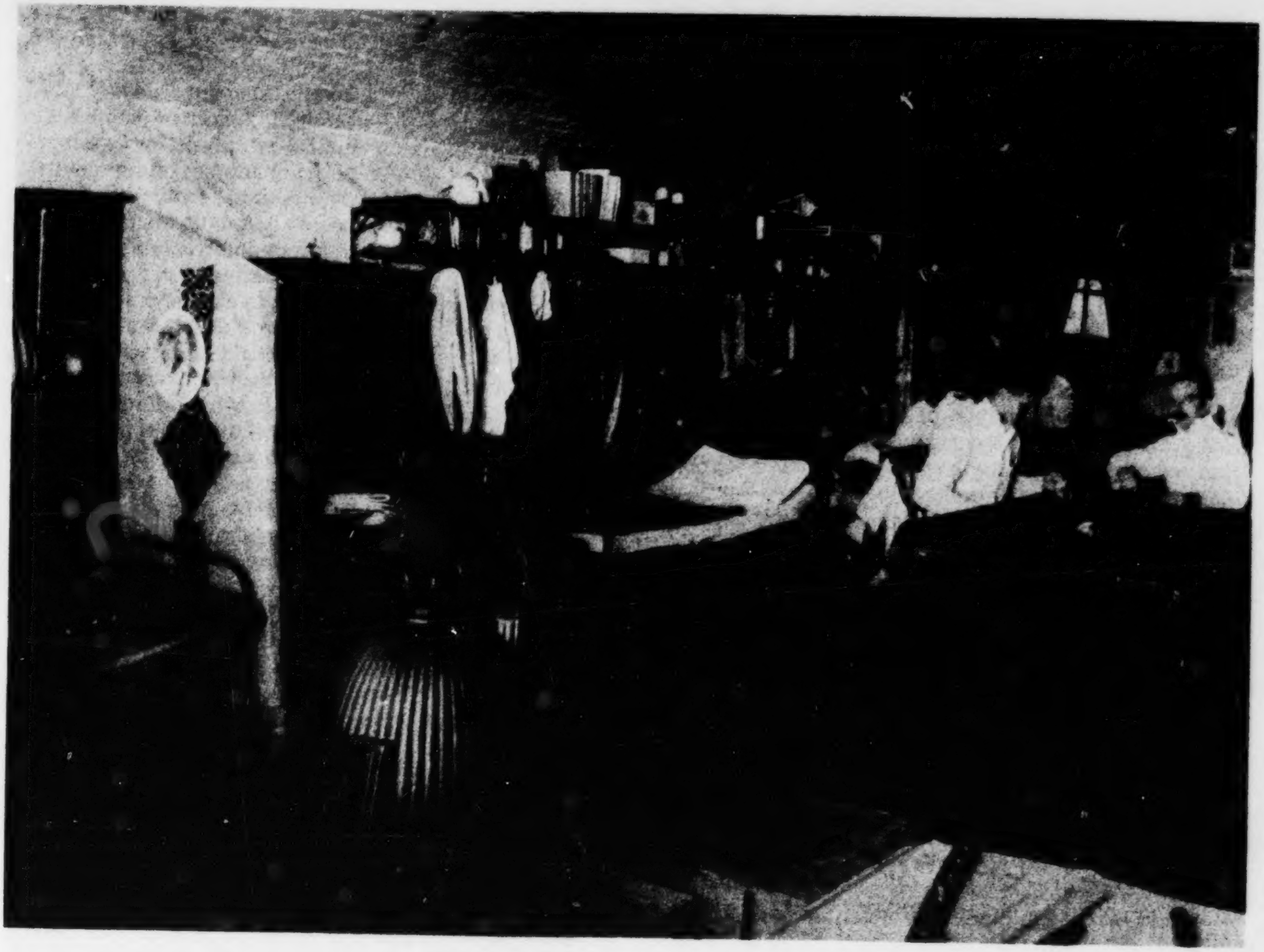
VII

London was wrong in assuming that the cavalier was of little importance to the Halifax garrison. It was true that the station was well below strength in the winter of 1854–55 because most of the British army was in the Crimea. Even the small remaining garrison, however, needed more barrack space. On 21 June Stotherd submitted an estimate

29 The interior of the redan casemates, ca. 1890.
(*Public Archives of Nova Scotia.*)



30 Interior of one of the redan casemates, ca. 1890.
(*Public Archives of Nova Scotia.*)



amounting to £944 0s. 7d. for the restoration of the cavalier.[54]

The scheme put forward in the estimate was essentially an elaboration of the roofing proposal which Stotherd had made at the end of his February letter. Besides installing a timber roof, it proposed to alter and enlarge the chimneys, to point the defective masonry joints and to whitewash the rooms. This implied the abandonment of the cavalier as a defensive work. Although the guns were left in place, the enlargement of the chimneys and the installation of the roof would make it difficult to get the gun positions cleared for action in time of war and impossible to fire them in peacetime.[55]

Authority to proceed with the scheme was quickly forthcoming.[56] By August Stotherd was able to report that he expected to be finished with the work within two months.[57] By this time, Stotherd had found solutions to most of the remaining problems of the Citadel. He no longer thought in terms of major alterations, but only of minor repairs which, he hoped, would be sufficient to silence criticism of the work and to keep it in a tolerably good state of repair. It is difficult to escape the conclusion that most of the items proposed were at least partly cosmetic in nature, but they did at least manage to keep everyone satisfied. In this rather undignified way, the Citadel project limped into its ultimate stage.

The nature of Stotherd's work is demonstrated by the type of item he inserted in the annual estimate for 1856–57. Of the £2,900 estimated for the Citadel, over two-thirds (£1,795) was for minor repairs of one sort or another, including £959 for repairing the asphalt over the arches, £38 for pointing the arches in the redan, and £529 for pointing masonry in the escarps, counterscarps and magazines.[58] This list covers two of the three major sources of complaint (the old escarps and the waterproofing) in the cheapest way possible.

In a report on the defence of the Nova Scotia command, submitted at the same time as the annual estimate, Stotherd defended his policy, especially in regard to the pointing.

> [The] *Curtain has been too long left in a most disreputable state and the comparatively trifling sum* [£528 17s. 10d.] *required for the extensive and very necessary repairs to the Scarps and Counterscarps of two long neglected fronts together with the pointing of the two magazines and their enclosures will, in my opinion, be most profitably expended.*[59]

The effectiveness of Stotherd's measures was varied. His assessment of the strength of the old walls was borne out by subsequent experience with them (*see* "The Very Model of a Modern Major General"). The experiment with the roof of the cavalier proved equally successful. A tabular statement of the condition and usage of the casemates drawn up in June 1856 reported that there was only a slight appearance of damp on the west wall and this could be easily corrected by additional pointing of the masonry.[60] The same statement revealed, however, that Stotherd had been less successful with the other casemates. A surprising number of them still leaked or showed evidence of damp on one or another of their internal walls. The report treated each case individually; there was no longer any attempt to assign blanket causes for the problem. One was damp because of faulty drainage; another because of decaying masonry; a third because the terreplein had not had time to settle properly – and so on, down a whole list of similar minor faults. In other words, the problem had reached the stage where it could be treated as a minor housekeeping difficulty, and no further large sums of money were needed to correct it.

As for the other features of the fort, most required only minor alterations. Most of the armament had been installed.[61] After a bad start, marred by the complete undrinkability of the water, the water tanks were in the course of being repaired.[62] It was not a particularly heroic ending but, with the exception of the glacis, the Citadel was virtually finished.

The Very Model of a Modern Major General

I

Halifax felt the outbreak of the Crimean War almost immediately. Troops from the garrison were dispatched to the front, as well as troops which had previously served in the city; local civilians volunteered for service, and Joseph Howe undertook to recruit in other parts of North America in order to get volunteers to aid Britain. The citizens of Halifax followed the fortunes of the British army with interest, and, like most of the English-speaking world, they rapidly became aware of conditions at the front. It was the first war in which newspapers played a significant role in providing the civilian population with detailed accounts of life in the army in the field, and the civilians were, for the most part, horrified. The administrative machinery of the British army had almost invariably faltered at the outset of previous campaigns, but no one except the military and a few well-placed civilians in London had known about it. But this was different. Every newspaper reader knew about the breakdown of supplies, the horrors of army hospitals, the bungling of the generals, and the other attendant misadventures of the army in the field. The cry was raised for the reform of the army. In the past, the antiquated and ridiculously complicated military machinery had been well protected by the entrenched interests of the officer class, the indifference of the politicians, and the enormous prestige of the Duke of Wellington, who would consider no change in the established order. But Wellington was dead; some of the officers themselves favoured reform; and the politicians, goaded by the public outcry, were thoroughly aroused. The administration of the army was at least partly reformed. The public, including the good citizens of Halifax, read in their newspapers of the changes. Those same citizens of Halifax would have been amazed to learn that one of the very incidental side-effects of reform was to be the last full-scale row over their slightly dilapidated Citadel.

II

At the outbreak of the war, no fewer than 11 different ministries, departments, agencies and boards were responsible for the administration of the British army. The four most important of these were the General Commanding in Chief, the Secretary of State for War and the Colonies, the Secretary at War, and the Master General and Honourable Board of Ordnance.[1] Without going into great detail, it is sufficient to note that the Secretary of State, with his twofold responsibilities, usually delegated military matters to the Secretary at War. The latter was only infrequently a member of the cabinet, rarely an influential politician, and, in practice, only had control over finance. The relationship between the Secretary at War and the General Commanding in Chief was made difficult by the fact that the latter's appointment was a prerogative of the crown and no one had ever delineated the precise relationship between the Commander in Chief and the cabinet. In any case, the gentleman holding the office was usually more eminent than the Secretary at War, who was as a result obliged to tread warily in contentious matters. No Secretary at War, for example, would ever have dared risk a major confrontation with the Duke of Wellington.

None of the above-named gentlemen had much control over the Master General and Board of Ordnance. The Ordnance not only supplied military equipment and built fortifications, it also ran what amounted to a private army, in the form of the engineers and artillerymen. Some (but not all) Ordnance officers held army ranks in addition to their regimental ones, but their chain of command led directly back to London and to the Inspector General of Fortifications (or, for the artillery, the Director General of Artillery) who was in turn directed by the Master General and board. This led to a ridiculous situation which has been well described by the historian of the Royal Artillery.

The presence in every garrison of that band of conspirators known as the Respective Officers, who represented the obstructive Board, and whose opinion carried far more weight than that of the General Commanding, was enough to drive that unhappy officer into detestation of the Honourable Board and all connected with it.[2]

This, of course, was the reason why none of the commanding generals in Halifax had ever interfered with the course of the building of the Citadel, despite the fact that some of them must have been annoyed or disgusted by the difficulties and crises of the 1830s and 1840s. Except for authorizing the use of garrison soldiers for construction work, they were almost as much spectators to the business as the civilians of Halifax. Perhaps this had been at the root of the disagreement between Colonel Nicolls and General Maitland in the late 1820s.

The reform of the army changed the entire situation. In August 1854, the office of Secretary of State for War was created and that of Secretary at War was abolished soon afterward. This meant that the gentleman responsible for the army finally had major cabinet rank. Out of deference to Lord Raglan, the last Major General, that office was retained until his death in 1855, at which time it was abolished. The Honourable Board disappeared at the same time. The administration of the Ordnance passed to the Secretary of State for War, and military command of Ordnance forces to the Commander in Chief.

These developments meant that the colonial detachments of the Ordnance were finally incorporated into the same structure as the rest of the army. The local Commanding Royal Engineers still reported to the Inspector General (Burgoyne had enough prestige to survive the debacle) but the local General Officer Commanding now had the authority to countersign estimates, policy proposals and other major items. The two chains of command ultimately went back to the same source: the Secretary of State for War and the Commander in Chief. Moreover, the surviving Fortifications department had lost much of its power and influence, and the local commanders could easily go over the Inspector General's head. Some of them proceeded to do just that.

The transition could not possibly have come at a worse time for the Ordnance staff in Halifax. The General Officer Commanding in Nova Scotia was one John Gaspard Le Marchant, who was also the lieutenant governor of the province. A brief discursion on Le Marchant's personal history is in order. He was a classic example of the problems of having a famous father. The elder Le Marchant had had a brilliant career as a soldier. He was something of a rarity in the 18th-century British army in that he combined an ability to lead with a genuine interest in the theoretical side of his profession. He had devised training procedures for the cavalry and had been instrumental in establishing the Royal Military College. He had helped to train an entire generation of young officers, most of whom subsequently proved their worth in the Peninsular War, many of them on Wellington's staff. He had also been acknowledged to be the best English cavalry commander of his era. On top of all that, his life had had all the elements of a romantic comedy. He had begun his military career by challenging his colonel to a duel and had successfully eloped. He was a respectable amateur artist and musician. He died leading a successful cavalry charge at Salamanca, and Wellington called his death a great loss to the army.[3]

The younger Le Marchant never attained the eminence of his father, who died when John Gaspard was six. He too had gone into the army – probably a mistake on his part – but unlike his father, had had to purchase his promotions. The father had been a successful and popular administrator; the son became a martinet. Eventually, after 26 years of service, uneventful except for a brief period in Spain during the Carlist wars, he drifted into a career as a colonial administrator. He was successively lieutenant governor of Nova Scotia (1852–57), Newfoundland (1859–64) and Malta (1865–69).[4] His relative failure in the army rankled, and he rarely lost the chance to make his military opinions known to anyone who cared to listen. When the Nova Scotia Ordnance establishment came under his command in May 1855, he was presented with a golden opportunity to make trouble, and he lost no time in seizing it.

On 2 July 1855 Le Marchant addressed himself to the Secretary of State for War on the subject of the Halifax defences. He was unsparingly critical. In his opinion the city was rendered virtually indefensible by the bad condition of all the principal works. He got in a dig at the Respective Officers in true Le Marchant fashion: these officers had undoubtedly performed their duties conscientiously, but the fact remained that the works were in deplorable condition. The Citadel, he noted, 1 Major General John Gaspard Le Marchant, Lieutenant Governor and General Officer Commanding, Nova Scotia. (*Public Archives of Nova Scotia.*)

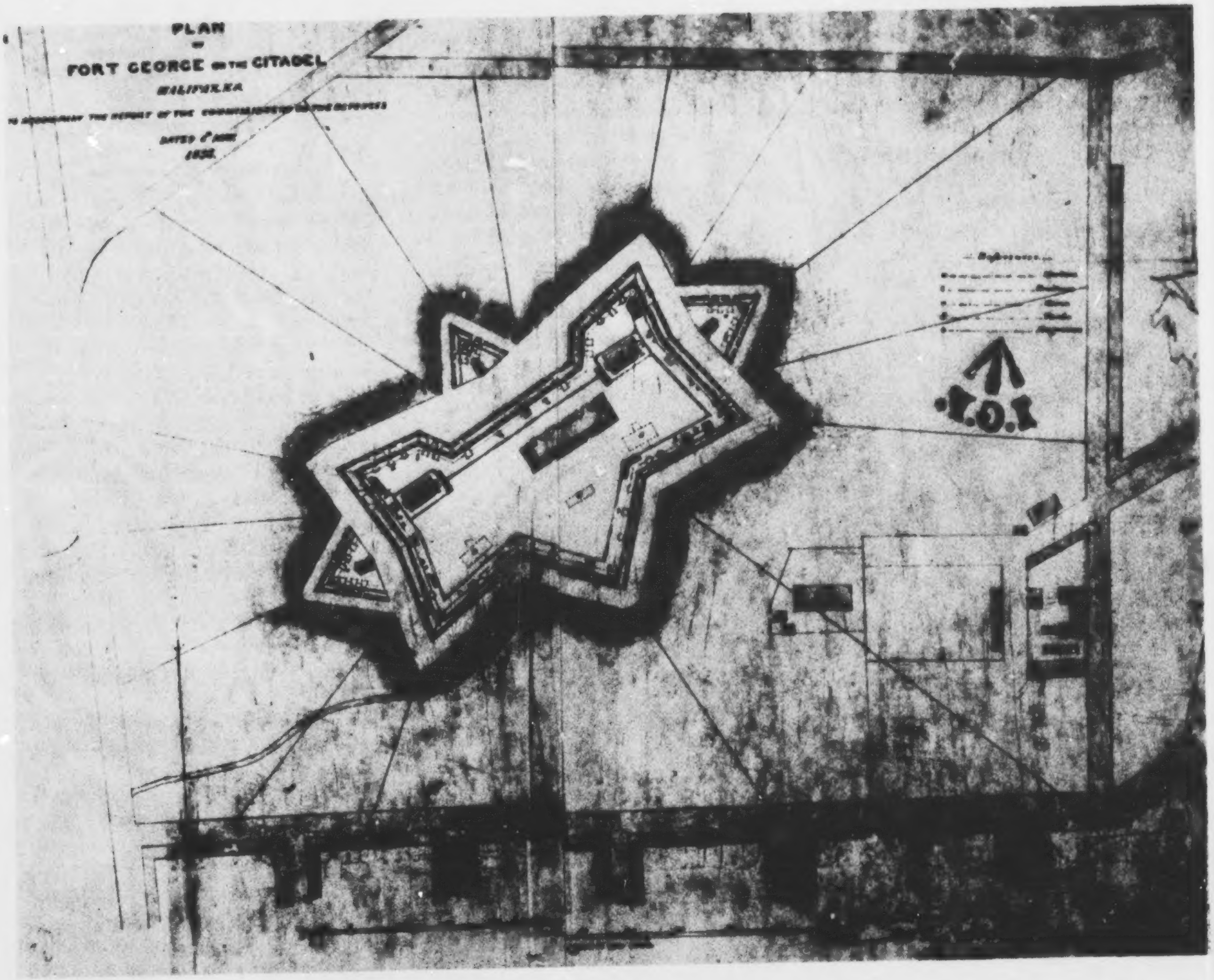
though commenced in the Year 1828 is still in an unfinished state, and the Cavalier which has always admitted the Rain and which was intended for the accommodation of 280 men is now uninhabitable.[5]

The matter of the cavalier was something of a red herring; in fact Colonel Stotherd had already dispatched a special estimate for repairing and re-roofing the building.[6] This had been approved in record time, and authorization for the repairs was dispatched on 28 July.[7] Nevertheless, London put pressure on Stotherd to explain the situation, and he did so on 26 August.[8] He noted that the Citadel work was being held up because the depleted garrison could not provide enough workmen, and, in any case, there was not much work left. The parapets had suffered to a certain extent from the cold of the preceding winter and the glacis was unfinished. As for the cavalier, repairs were under way and would take only two months.

The Ordnance annual estimate dispatched to London a month later repeated the same point. There were seven items for the Citadel, only two of which were for new work (the glacis and the parade). The remainder were all for routine maintenance.[9] The majority of items in the estimate were of a similar nature. Stotherd wrote,

The services in Items 1 to 31 inclusive are for the most part essential for putting the several defensive works in a proper and efficient state, and for the due maintenance of the

32 "Plan of Fort George or the Citadel," 1856. This plan was drawn to accompany the final report of the 1856 estimate. *(Public Archives of Canada.)*


PLAN
FORT GEORGE
CITADEL

same in conformity with regulations as also with the desire of His Excellency the Major General Commanding.[10]

A few days later, Stotherd addressed a long letter to Burgoyne, setting forth at length the condition of the defensive works in his command. On the subject of the Citadel, he had comparatively little to say; most of his comments concerned defects which would be remedied by the approval of the estimate for the coming year. The only exception was the old ironstone masonry in the escarp on the west front. This, he admitted, was in poor condition, but it had stood for almost 25 years and would, with care, continue to stand. He recommended pointing the masonry to ensure its survival.[11]

Stotherd had a breathing space of a couple of weeks after Le Marchant's first sally. He had, it seemed, met and survived the attack – but this was true only insofar as he had answered general objections. Le Marchant proceeded to change his approach. On 10 October his military secretary sent Stotherd a list of questions directly concerning the Citadel, and, on the same day, the general sent a copy to Lord Panmure (the Secretary of State for War) in London.[12]

Why Le Marchant chose the Citadel as the focus of his complaints is not entirely clear. Certainly the lesser defences, after a couple of decades of neglect, must have been in worse shape. The most likely explanation is symbolic: the Citadel was the most prominent work in the general's command. Moreover, it had absorbed the greater part of the money spent by the Ordnance in Nova Scotia for a quarter of a century, and, should it prove faulty, would demonstrate that the old system had indeed been inefficient.

Le Marchant's questions were specific. He wanted to know how long it would take to finish the work; how many guns could be mounted; whether or not the battery on top of the cavalier could be safely fired; the quantity of water available; the length of time needed to complete the glacis, and whether or not it would be better to complete it by contract. He noted that the west curtain seemed, to his eyes at least, to be completely rotten; that the cavalier was in such a bad state that it was unsafe to fire its guns; that the redan salient was exposed because the escarp was too low, and that there were faults with the construction of the parapet and terreplein. He ended by requesting a history of the work.

Stotherd replied on 22 November.[13] Since most of Le Marchant's questions were ultimately incorporated into the still longer list which he presented to the commissioners in the following year, it is unnecessary to quote at length from Stotherd's replies. The colonel wisely attempted no more than direct factual answers, even when the phrasing of the questions invited editorial comment or justification. He produced elaborate calculations to demonstrate that the use of contract labour in the work on the glacis would be more expensive than the use of soldiers. This apparently convinced Le Marchant, for the question was not raised again.

Having carefully done his duty, Stotherd sent a copy of his correspondence with Le Marchant to General Burgoyne.[14] The Inspector General was infuriated by Le Marchant's treatment of the colonel.

I regret very much that His Excellency the Major General Commanding should have thought it necessary to adopt a tone of such censure in the letter of the 10th October written by his direction to the CRE, which by the explanation given by the latter appears to have been quite uncalled for.[15]

Burgoyne realized the implications of Le Marchant's attack. Should the general's allegations be substantiated, the whole business would reflect badly on the Fortifications department, which was still extricating itself from the wreck of the Board of Ordnance. The last thing Burgoyne needed was a scandal. Even a minor one could do a great deal of damage. From December on, he directed his considerable ingenuity and influence toward defeating Le Marchant; but for the moment he could do nothing directly. Everything depended on the attitude of the Secretary of State for War. How seriously would Panmure take Le Marchant's allegations?

The answer arrived on 28 December. Le Marchant's dispatches containing his correspondence with Stotherd, which had arrived in London in early December, had meandered around the War Office for a couple of weeks and had finally been sent to Burgoyne with a request

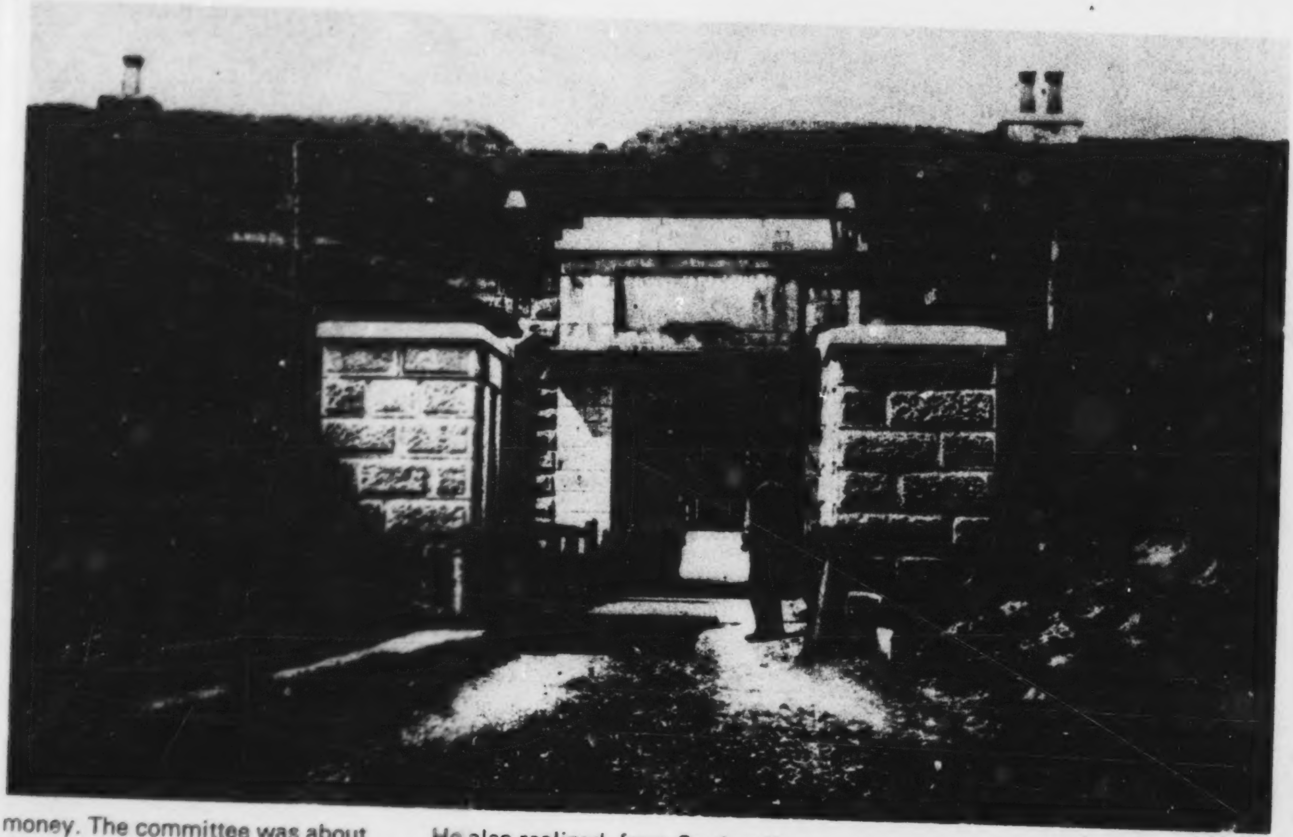
33 The counterscarp gallery opposite the south face of the redan, 1950. This photograph was taken in the part of the gallery which runs under the gate. (*Public Archives of Canada.*)

for a report on the subject. This gave Burgoyne his chance. After 50-odd years in the army, he was a consummate expert in the game of bureaucratic politics. If Panmure wanted a report, how could he possibly fail to be satisfied with one prepared by an entire committee of experts empowered to examine the site at first hand? At one stroke Le Marchant would be prevented from lodging more complaints and the whole business would be settled quickly. The idea was immediately proposed to Panmure and was rapidly accepted.[16]

The composition of the proposed committee was a work of art; it presents a classic example of the manipulation of things in such a way that nothing can possibly go wrong. Burgoyne proposed that the commission be composed of the CRA and CRE in Nova Scotia, the CRE in Bermuda, a naval officer, and an officer appointed by Le Marchant. The importance of this selection lay in the fact that three of the five were Ordnance personnel and the fourth (the naval officer) could almost certainly be counted on to go along with the others. No matter what attitude Le Marchant's appointee adopted, his was only one voice in five. The scheme was plausible enough – the Ordnance officers were, after all, the only experts available – and had an air of impartiality. Le Marchant could hardly object to it. Burgoyne must have been well pleased with his handiwork.

Whatever his faults, Le Marchant did have enough political acumen to give Burgoyne a run for his

34 Photograph of the gate and bridge, ca. 1870. The post-and-chain fence along the top of the counterscarp was installed in order to prevent people (drunken soldiers being the worst offenders) from falling into the ditch. *(Public Archives of Canada.)*



money. The committee was about the last thing he wanted. Word of it reached him in February, and in the two months remaining to him, he set about making as strong a case for himself as possible. He realized that his only chance of making any headway against a packed committee was to dig up something so scandalous that the committee members, being officers and gentlemen, could not possibly ignore it.

He also realized, from Stotherd's answers to his questions, that the majority of the points he had raised could be satisfactorily answered. The one area about which Stotherd had been relatively evasive was the state of the old ironstone escarps. Was there something scandalous to be found there? On 9 March he asked Stotherd for "the whole of the Contracts for the Citadel and their specifications" as well as for information on expenditure over the years.[17] Stotherd – after telling Burgoyne about the request[18] – promptly turned over the documents in question. Among them were the contracts for masonry let by Nicolls in 1829–30.[19] These suggested that there was indeed something to be gained by raising the issue of the old masonry.

To ensure that the examination of the masonry in question was thorough, Le Marchant requested that an independent expert, a Halifax building contractor named Forman, be permitted to conduct his own examination of the Citadel. Panmure agreed to the request.[20] This may well have been a mistake on Le Marchant's part, since it worsened his relationships with Stotherd and Burgoyne without gaining much of a tactical advantage. After all, there were no fewer than two engineers on the commission, and neither was likely to admit that a mere colonial contractor knew more about masonry than they did. But the move did ensure that an independent assessment of the work would be placed on record and sent to London. It was a comment on the relative decline of the Fortifications department that an army officer could successfully impose such a condition. Nevertheless, the odds were still in Burgoyne's favour as the committee began its deliberations on 24 March 1856.[21]

The five members of the committee were Stotherd, Lieutenant Colonel Williams (CRE, Bermuda), Lieutenant Colonel Dick (CRA, Halifax), Commander Shortland (Royal Navy) and Lieutenant Colonel Thomas Le Marchant, the major general's brother. The committee was to answer a total of 59 questions drawn up by General Le Marchant, and to give recommendations for repairs, alterations and future works. Of the 59 questions, 27 were general, 10 concerned armament, 2 concerned provisions, and the remaining 20 all concerned the state of the masonry. The last were, of course, the most significant since they reviewed the whole matter of the work done by Colonel Nicolls at the outset of the building, and implicitly questioned the competence of Nicolls and his immediate successors. They also raised issues which the Ordnance department had not properly faced when it rectified Nicolls's mistakes in the early 1830s. Specifically, they concerned the work done under contract and the legality of the contracts themselves.[22]

The other questions were easier to answer. The beauty of Burgoyne's scheme had, in part, consisted of the fact that it left Le Marchant to draw up the questions which were to be put to the committee members. Neither of the Le Marchants were trained engineers. In consequence, they missed some extremely obvious defects in the plan of the Citadel. Occasionally they noticed symptoms of the defects, but because of their limited knowledge of the subject, their questions were not sufficiently specific to force any admissions from the engineers on the committee.

The best example of this involved the questions concerning the exposure of the upper portions of the escarp in the redan and in the western face of the north front. Such exposures were, in fact, the result of the engineers' inability to form a proper glacis in these areas, and had Le Marchant realized this, he might have gotten a damaging admission from the committee members. As things stood, only the two engineers on the committee knew the truth, and they were not about to tell anyone. The exposure on the western side was explained away by pointing out that there was no place in the vicinity where an enemy could set up a battery and that the fort was well covered on the eastern front, both from the ships in the harbour and from the guns of Fort Charlotte. Similarly, the committee explained, the 8-inch gun at the redan salient could not command the glacis immediately below it because it was intended to cover the harbour. The committee did not feel obliged to point out that *none* of the guns could command the glacis below the redan salient because the slope was too steep.

The remaining general questions were even easier to answer, since almost none of them raised serious objections; some of them, in fact, were silly. The committee members were quite right to point out that at no time was the cavalier intended as a keep and that it was erroneous to consider it as one. Where Le Marchant did raise a legitimate question, it was reasonably dealt with. Certain small errors in construction were noted and alterations were advised but, on the whole, the committee passed off Le Marchant's general questions without difficulty.

The questions on artillery and provisions also raised no important issues; they merely served to get the answers on record. The masonry questions, on the other hand, occupied a great deal of time. To answer them, the committee was forced to call witnesses, collect legal opinions and open part of the old masonry to find out whether or not it was likely to remain standing. This took the better part of a month, and resurrected events which had

35 Photograph of the south ravelin ramparts, ca. 1870. This is the only surviving photograph showing the original armament of any part of the Citadel. The guns on the face of the ravelin are 6 ft. 6 in. 32-pounders on garrison carriages, and the ground platform is of the type provided for in the 1846 estimate. The gun mounted on a traversing platform at the salient is a 9 ft. 6 in. 32-pounder. *(Public Archives of Canada.)*

been forgotten for 26 years. In the end, Le Marchant succeeded in at least part of his ambition; the workings of the Ordnance department were examined by outsiders as they never had been before.

Before this, no one had ever examined the Nicolls contracts. Were they not, asked Le Marchant, "loosely drawn up and ill defined?" n answering this, the committee called for opinions from three people, two Clerks of the Works and Mr. Forman, the contractor appointed by Le Marchant to make an independent examination of the masonry. The committee posed three questions to Mr. Forman:

1. May not the [three contracts] . . . *be considered very loosely drawn up and ill defined?*

2. Would a practical and experienced person consider them sufficiently binding to ensure the work being properly executed?

3. As a practical Man do you on reading the Specifications produced clearly understand their meaning?[23]

Forman, in reply, noted that he "had found it necessary to be more explicit" in his own contracts and had some specific complaints about the wording, but, in general, was unable to come to any definite conclusion about them. Mr. Gordon, a Clerk of the Works, found no faults[24] while Mr. Shiras, the second clerk, noted that one clause provided for superintendance by the department:

I consider this clause . . . to be

sufficiently binding, and that by strict and due superintendence on the part of the Department, that it would secure the Works to be executed in Accordance with the meaning of the Specification, altho' the arrangements and provisions in its detail are very different to that which must be introduced at the present time.[25]

Shiras's answer raised the whole question of how closely the works had been superintended. Fortunately Richard Creed, a former Clerk of the Works who had held the position during Nicolls's tenure, was still alive and still in Halifax, and the measurement book for the period had been located. The committee examined Creed as to its accuracy:

3. [Q] *Are the entries in the Measurement Book now produced, in your handwriting? –*

3. [*A*] *Yes.*

4. [Q] *Was an Officer of the Royal Engineers always present at these Measurements?*

4. [*A*] *There was; – he always took the dimensions down in a separate book which were compared with the entries in my measurement book.*[26]

The committee did not see fit to submit the contracts for the opinion of a solicitor, and Le Marchant neither discovered the correspondence between Nicolls and the Solicitor General of Nova Scotia on the subject[27] nor learned that the last set of contracts (1830) had been let without tenders. On the basis of the evidence presented, the committee was able to conclude only that "some of the clauses . . . might have been drawn up with greater precision and clarity," and that they were "sufficiently binding to ensure that the walls were built according to the specification." Thomas Le Marchant disagreed, but was forced to admit on the basis of Creed's evidence that he thought the walls had been "actually built quite equal to the specifications."

In the course of collecting evidence, the committee discovered a few odd facts about the methods of building employed by the department in the early days. William MacDowal, a master mason who had been employed on the works, testified that Nicolls had used masonry of lower quality than was required later as a means of saving money, and that the working season had usually gone on a month or so later than was needed for the new work to set before the onset of the first frost.[28] But no really embarrassing facts emerged from the examination of the witnesses.

The story of the failures was, of course, well known, and Le Marchant made no attempt to exploit it. He was content to get it on record that £17,585 11s. 2d. (according to the committee's reckoning) had been spent on making the failures good. The committee also noted that "the new work is of superior dimensions and quality to the old."

The critical question was whether or not the remaining contract masonry could be expected to stand. This, the committee established, included

About 3/4 of the Escarp wall of the South face, East Front: – 3/4 of the South Front: – about 1/8 of the flank of the South West Demi-Bastion: – the whole of the West Curtain: – the flank of the N.W. Demi-Bastion and the two faces of the North Ravelin: – also 140 feet of the Counterscarp in front of the left Face of the N.W. Demi-Bastion: –

To establish the condition of this work, the committee collected opinions and made openings in two places. They concluded that

[these walls] *are not in every respect well built; the facing stones are in various instances unsuitable in dimensions for Such walls. –*

They are of a weak profile being inferior to that which Vauban prescribed, and are not in as satisfactory a state as the remaining Escarp Walls built by the Department; yet as they do not appear to have altered or bulged during the last 26 years . . . and being perfectly covered from the foot of the Glacis, and only 3 feet of them being visible from an eminence called Windmill Hill, . . . they could only be breached from the Counterscarp, from whence the difference of time to breach a good and a bad wall is a matter of only a few hours: – We therefore recommend that they should remain for the present, being of the opinion that with careful stopping and pointing . . . they are likely to stand for many years. –

An opening made in the Escarp of the West Curtain and another in the left Face of the South West demi-Bastion shew that the backing and mortar are sound and good, the latter only, for about a foot inwards, having been destroyed by the action of frost, owing to the neglect of pointing.[29]

Thomas Le Marchant refused to endorse this judgement on the grounds that Mr. Forman had not yet made his independent examination, and complained that the other members should have withheld their opinion until Forman had reported. His objections were noted, but the other members declined to withdraw their observations, and there, for a short time, the matter rested.

The rest of Le Marchant's questions about the masonry were easily answered. The masonry work done by the department was, the members considered, sound, although there were slight bulges in parts of the interior retaining wall. As for the cavalier, the committee decided that it was sound and could easily withstand the shock of having its roof battery fired (although the members do not seem to have gone to the extent of firing the guns to find out for sure).

The committee was concluding its deliberations when Forman's report arrived on 1 May. Forman disagreed with some of the committee's judgements, but not to any great extent. He considered the interior retaining walls to be in a more serious state than the committee admitted, and he took rather a dim view of the old masonry.

The rubble walls generally and especially the West curtain and South front are in bad condition; the water percolates through most of the oints; – they are pushed forwards and in many instances, the stones have been forced out of the walls.[30]

Finally, he noted that the longitudinal walls of the cavalier had "been lifted out of their original position and separated from the arching abutting across the cross walls."

Forman had also opened several of the rubble walls – he does not say which – and concluded that "the stones had not been skilfully arranged, the walls not built solid nor proper precautions taken to bind the work together," and concluded that "masonry in these walls cannot last for any length of time."

The committee's response took the form of a brief rebuttal of most of Forman's points. The tone of the reply implied that Forman, as a civilian, could not be expected to know what a work of fortification should look like. It was agreed that frost would eventually destroy the contract masonry, but the committee was of the opinion that nothing needed to be done about them "until more decided symptoms of failure exhibit themselves." As for the cavalier,

the only lifting we have been able to discover is in two or three upper courses of a 4-1/2 asphalted brick lining to the interior slope of the top parapet, which lining the frost has fractured and rotted in various places.

Similarly, the bulging in the interior retaining walls was due to minor failures in the recess arches which, the committee thought, could be repaired only by expensive alterations.

Thomas Le Marchant, needless to say, disagreed with these conclusions. He did not share the other members' opinion that the interior masonry which had been examined was good, and he thought that the old contract walls should be taken down and rebuilt "as soon as the Citadel is in other respects perfect." He also noted that when the ground at the foot of the recess piers in the interior retaining wall of the south front was opened to examine the footings, "the hole filled with water nearly to the surface of the parade," from which he inferred, reasonably enough, that the works were "standing in water." The other committee members pointed out that the ground was still saturated with water from melting snow.

The committee's conclusions were numerous, but none was particularly critical of the Ordnance department. The comments on the masonry (quoted above) were allowed to stand; Colonel Le Marchant's objections were noted separately. The committee recommended several things: the glacis should be completed quickly; the brick revetments in the ravelins should be removed; a couvre-porte in front of the gate should be constructed in order to facilitate sorties; 68-pounders should be substituted on the south salients; Addison's shot furnaces should be provided, and a few other minor items should be taken care of. The report was signed by all five members of the committee on 5 May.

Stotherd dispatched a copy of the report to General Burgoyne on 7 May.[31] The Inspector General must have been pleased with the results of his scheme. Although parts of the report *could* lead to questioning, if they were examined more closely, and though some of it shed rather an uncomplimentary light on the work done by the department 25 years earlier, it was, on the whole, a vindication. It stopped further criticism and it effectively silenced Le Marchant. He never risked another major encounter with Burgoyne during the remainder of his term at Halifax.

One question remains for the modern historian: How much of the report was whitewash? Considered in isolation, it would be difficult to determine. But given the history of the work, given what we know about the building done under Nicolls's command, it would seem reasonable to believe Forman's assessment of the old contract-built walls; the engineers on the committee had managed to cover up the facts, at least partially. Fortunately there is enough evidence – sketchy as it sometimes is for the later period – to reach a conclusion. The old walls stood far longer than even the most sanguine member of the 1856 committee had any right to expect. Part of the south face of the southeast salient had to be externally buttressed at some point in the late 19th century, and ultimately had to be propped up with timber in the 1930s, but the rest of the walls stood and still stand. Until it was rebuilt in 1973–74, the west curtain remained more or less intact, looking, one suspects, only slightly more decrepit than it had a century earlier. (Now rebuilt, it probably looks better than it ever did.) In most respects, then, it would seem that the 1856 committee members acquitted themselves well; they salvaged the honour of the department without greatly sacrificing truth.

Of Mr. McCully's Cow and Other Matters

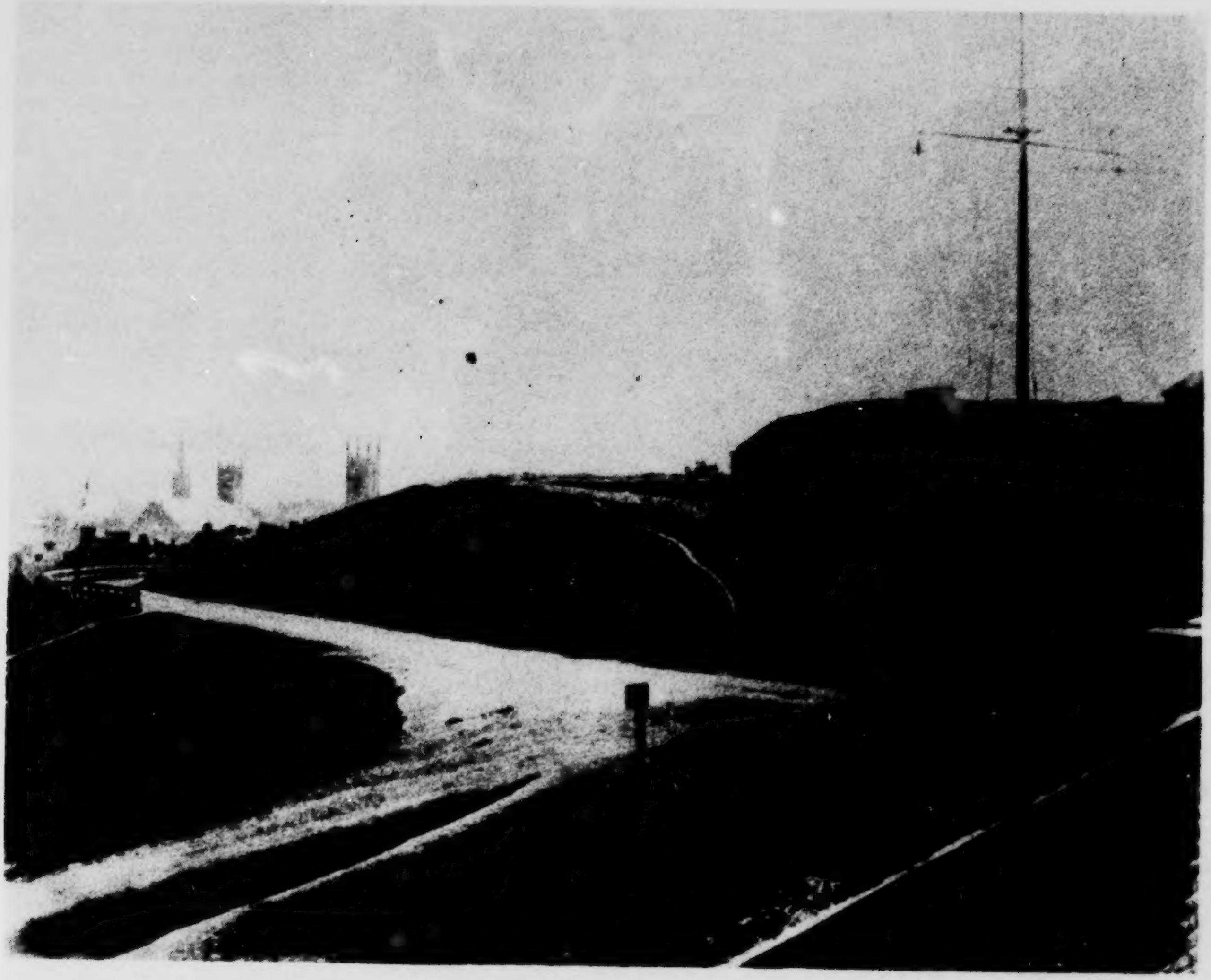
I

In October 1857, Colonel Stotherd drew up the last report of cumulative expenditure on the Citadel.[1] It showed that £241,122 had already been granted toward the completion of the work and that another £1,000 had been requested for the following year (1858–59) for a grand total of £242,122. Of this, £237,521 had already been spent. The return is marked "Discontinued – not required by the I.G.F." – a sure sign that London considered the project completed.

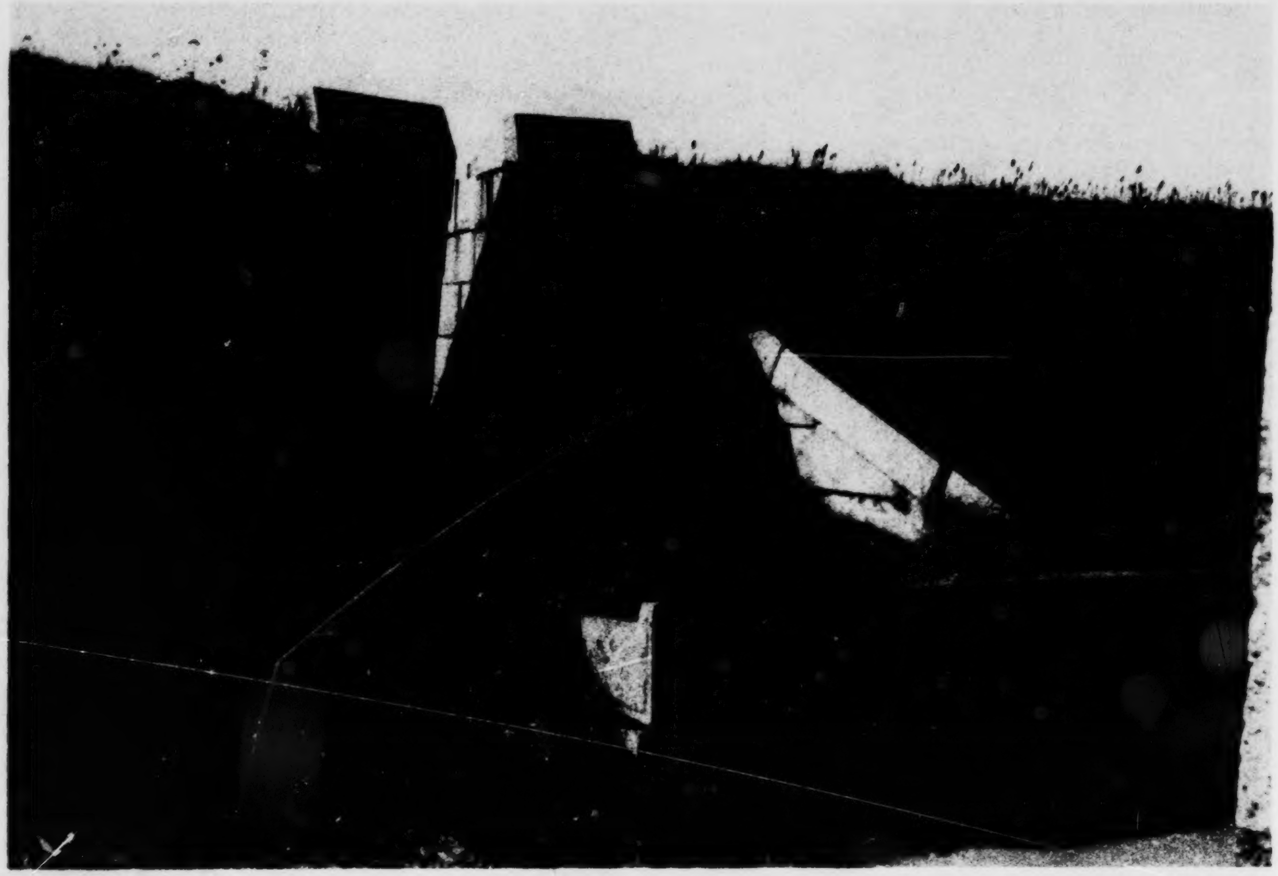
Stotherd endorsed this view when he reported a couple of months later that the entire Citadel "with the exception of the glacis" was complete.[2] The glacis, however, was still a major expense. Stotherd requested and got £1,000 toward its completion in the annual estimate for 1858–59[3] and asked for a like sum in the annual estimate for 1859–60.[4] The work proceeded at a leisurely pace. Apparently the glacis was built up section by section, with only one part of it under construction at any one time. Stotherd, therefore, felt secure enough to rent out the remainder of it for grazing, and a notice inviting tenders was issued in April 1858.[5] The highest bidder was one Mr. Thomas Neville, who leased the glacis for the period from 9 May to 30 December 1858 for the sum of £33 5s. 0d.[6]

Stotherd's slow and methodical way of proceeding suited everyone. All the Commanding Royal Engineers from Boteler on had realized that, because of the shape of the

36 Looking south from the south face of the redan, ca. 1865. This is probably the earliest surviving photograph of the Citadel. Note the gun mounted *en barbette* at the salient of the southeast salient, and the signal mast to the right of the picture. The glacis was never entirely completed, as this photograph shows. Note the footpaths and the loose gravel near the counterscarp in the right foreground. Note also that the view from the redan face was severely restricted by the steepness of the ground and the existence of the road. (*Public Archives of Canada.*)



37 Detail of one of the west ravelin embrasures, 1971. The granite embrasures in the west ravelin were unique in the Citadel. There were originally four of them, two in each face. Two now survive. *(Photo by author.)*



ground and the boundaries of the War department property, the construction of the glacis would be difficult. In some areas especially on the eastern front, it would be impossible to produce a shape which conformed exactly to that prescribed in the fortifications textbooks. Stotherd's approach to the problem was one of unobtrusive compromise. He would build the best glacis he could under the circumstances, and try both to keep expenses low and to prevent any hint of the difficulties involved from reaching his superiors. He reasoned, correctly, that no one had any desire to have old wounds reopened; the roots of the difficulty went all the way back to Nicolls's original designs 30 years ago. The lease of the glacis was probably only a way of announcing that business was proceeding as usual.

It was at this juncture that Stotherd was recalled to England. His successor, Colonel Richard John Nelson, was in many ways the most singular Commanding Royal Engineer ever to serve in Halifax. He was a specimen of that peculiarly Victorian type – the insatiably curious amateur scientist. Humourless, righteous and pedantic, Nelson nonetheless had some impressive achievements behind him when he came to Halifax. He was the author and illustrator of the definitive study of Bermudan geology. He had produced articles for the professional papers of the Royal Engineer corps on a variety of topics in military and civil engineering, and he had been one of the editors of *The Aide-Memoire to the Military Sciences*, the standard dictionary on the subject for all his fellow military engineers. His most recent publication had been a book on the study of German which he had given the curious title, *Lockspeise or Inducement to the Study of German of the Last Serious Difficulty in the Way of a Beginner.*[7]

Despite the apparent variety of his writings, most of Nelson's works fell into two classes; descriptive catalogues of physical phenomena and articles presenting systematic approaches to specific tasks or problems. In the second category, his articles on the composition of military reports[8] and on the duties of an engineer officer[9] reflected his belief that there were correct and incorrect ways of doing things. This rigidity of opinion, coupled with his natural interest in the minutiae of engineering, made him potentially troublesome as a practicing military engineer. He had, after all, spent several decades studying the various aspects of permanent fortifications – had even advanced a system of his own.[10] The *Aide-Memoire*, which he had helped to edit, laid down the requirements for a proper glacis for a fortress. It was hardly possible that such a man could ignore the defects of his predecessors' work at Halifax. His appointment only served to stir up an old controversy at a time when all the principals devoutly hoped that the whole business of the Halifax Citadel was finally settled. Fortunately Nelson's narrowness of mind prevented the affair from being little more than a long series of exchanges between himself and his immediate superior, a farcical epilogue to a five-act bureaucratic comedy.

II

Nelson's first letter on the subject began on an optimistic note. "In the course of the financial year 1859–60 it is probable that the Citadel Glacis will assume its main form and final dimensions," he wrote General Burgoyne on 14 December, and added that "it is equally probable that it will not be completed within that time."[11] There were, however, numerous problems, and the colonel requested in the same letter, "*authentic* information on the greatest *effective* depression of guns on garrison carriages [emphasis his]." It appeared that there would be some problem with the steepness of the glacis slopes. They were "perhaps too steep for direct defence from their own guns" and it was

> *indispensible* [to] . . . *know how high certain slopes be left or brought up to have them if possible under the direct fire of their own or, in some cases, even flanking artillery: – and this last leads to an Engineer question which will be stated in another letter of this date.*

The second letter put the problem more directly and referred specifically to the eastern front of the Citadel. Nelson posed two questions:

1. Is a Glacis to be so continued in one plane from crest to foot, even if it be top dead by so doing even to collateral fire? –

2. Is the Glacis to be left sufficiently raised to admit of its being defended by such guns as can see it: though by so doing a dead bank . . . be left.[12]

He then proceeded to supply his own answers:

The only means I can devise . . . is shewn in yellow generally on the plan accompanying,[13] *where the dead ground at the foot of the glacis and running along the West side of Top* [Brunswick] *Street is proposed to be flanked by a 4 gun Battery (Casemated or not) directed on and seen into by the works in the rear, by which means the said dead portion will be flanked by 2 guns in each direction –*

In other words, Nelson was proposing a major alteration to the accepted design of the eastern front by placing a battery in front of the ditch to cover the dead ground below the town clock. Realizing, perhaps, that it might be impolitic to propose further alterations in an already much-altered design, Nelson concluded by stating that he had "avoided all allusion to details . . . pending decision on the question now submitted."

The tone of these communiqués sounds false. The ostensible question which prompted them – the maximum depression of the guns – was not the sort of thing an experienced engineer should have had to refer to London, and the suggestion of an alteration, even under a separate cover, sounds much too convenient. Nelson, in all probability, had taken one look at Stotherd's arrangements, decided to alter them, and set about pushing Burgoyne into agreement. His methods must have been as transparent in 1858 as they are now – Burgoyne, after all, was an experienced politician – but then subtlety was never one of Nelson's salient features.

As it happened, London had unwittingly provided Nelson with a second excuse to raise the issue of the glacis. On 2 December, the Inspector General's office requested information on the item for £1,000 which Stotherd had included in the estimate for the following year. The text of the letter has not survived, but apparently it requested sections showing the progress of the glacis and information explaining the need for so much money. This providential coincidence of interest between London and Halifax (even if both sides were pulling in opposite directions) must have delighted Nelson. He promptly replied that he was unable "to give any *detailed* account, until I shall be favoured with your decision as regards my letters nos. 970 & 976" (those concerning the depression of the artillery).[14]

The matter now rested in London's hands. Unfortunately there are no copies of the Inspector General's replies at present available in North America, and as a result the considerations behind the policy finally adopted are unknown. The policy itself, however, is plain enough. London procrastinated at first, as usual; Nelson requested a reply to his two letters twice (on 23 February and again on 21 April).[15] It was tactless of him to try to hurry a decision; the most tangible fruit of his labours was a reduction in the amount granted in the 1859–60 estimate from £1,000 to £500. On 24 June, Nelson complained that this would "hardly last out until the end of Sept." and asked for £250 to £300 more to enable him to work until the end of the season.[16] This request was apparently denied.

The next round opened in the fall of 1859 when Nelson again included an item for £1,000 for the glacis in the annual estimate for 1860–61.[17] This time, the Fortifications department deleted the item entirely. The estimate arrived back from London with the £1,000 struck out with red ink and a marginal note in the same colour which read:

A definite project with full details and quantities for the completion of the Glacis should be submitted as until the exact further expenditure is clearly shewn, the Secretary of State will be unable to take any vote on account of this work.[18]

London was employing the same tactics which had slowed up the work of Boteler, Peake, Jones and Calder, although in this instance the delay was more justifiable. The only new element in the process was the prominent role allotted to the General Officer Commanding in Nova Scotia. The structure of command of the post-Crimean army allowed London to relegate the controversy to the comparative obscurity of the colonial command, and after April 1860, it was largely conducted at that level. The other protagonist in the ensuing battle was Major General Charles Trollope (the novelist's cousin) who was well acquainted with Nelson's foolishness; by the spring of 1860, the two men had been conducting a comic vendetta over another aspect of the glacis for almost two years.

III

Nelson's skirmishing with Trollope stemmed from the colonel's conception of the management of an efficient military establishment. The conditions under which work on the glacis had to be carried on appalled him. Even in the 1850s, urban development had spread as far as North Park Street on the north side of the Citadel and South Park Street on the south. Since the Citadel was squarely in the centre of the city, the local citizens were wont to treat it as their collective property. They took shortcuts across the slopes of the hill in getting from one part of town to another, took tourists to the crest of the glacis to get the best view of the city, picnicked there on holidays and (apparently) caroused there during the summer nights – all of which was bound to offend Nelson's sensibilities. Moreover, some of the citizens kept livestock on the common, and the animals were forever straying (Nelson claimed that they were purposely allowed to stray) onto the glacis, pawing up the turf and eating the grass. All this, so far as Nelson was concerned, was intolerable. Proper respect was *not* being shown for the War department's property. What was worse, the work being so carefully performed by the engineers was being undone by the wanton depredations of the populace. Soon after he arrived in Halifax, Nelson resolved to do something about it.

His colleagues first learned of his intentions in the spring of 1859. The Deputy Commissary General had routinely called for tenders for the lease of War department lands in Halifax on 12 March. The land to be leased out included, of course, the Citadel glacis. When the tenders were opened on 15 April, it was found that only one man had applied for the glacis, the same Mr. Thomas Neville who had rented the land the previous year.[19] At this point, Colonel Nelson announced that he considered it inadvisable to lease the glacis at all. He justified his position in a letter to Lieutenant Colonel Fordyce.[20]

> *I beg to state for the information of the Major General Commanding, that my Predecessor* [Stotherd] *gave me* no *intimation that the Glacis was not to be let; – he merely charged me with forbidding Goats to graze on it, as peculiarly destructive animals.*
>
> *According to my own views of the case, the Glacis should not be let for grazing until two years after having been completely sown with grass seed.*[21]

In refusing Neville's tender, Nelson presented General Trollope with a *fait accompli.* Trollope allowed the incident to pass, but took it as a slight on his authority. As he observed to the Secretary of State for War,

> *I think it would be desirable for me to know whether or not the CRE is to decide the question of not letting lands free from superior control as in the note is implied, or whether the General Officer is to direct such matters; for it appears to me that we are drifting out of the system heretobefore established.*
>
> *It would seem to me by the note, that the CRE assumes the right of veto, without reference to any superior power, whilst it is evident by the written letters that the subject had not entered his mind until I directed his opinion to it.*[22]

Nelson had, therefore, managed to offend Trollope even before the colonel opened his campaign against the citizens of Halifax. He had, moreover, picked the worst possible time to begin such a campaign. In the summer of 1858, the military removed fences and destroyed gardens on the west side of the common, claiming that they infringed on War department property. The city counterclaimed that the land in question belonged to the city corporation, and proceeded with litigation claiming £1,000 damages. In December 1858, Nelson was given power of attorney for the War department, and as a result was named as defendant in the city's suit. On 7 June 1859, he was summoned to appear in court on the following 1 October.[23] Nelson, writing to Fordyce on 19 July, alluded to the possibility of an "amicable" settlement,[24] but one cannot accept his phrase at face value; at the same time as he wrote, he was devising ways and means of keeping the citizens off his beleaguered glacis. A few weeks later, he wrote again, suggesting specific measures which could be taken. The letter has not been located, but it would seem to have suggested fairly drastic measures to uphold the rights of the military. It brought a withering reply from Trollope.

> *The Major General Commanding does not feel disposed upon his own authority to meet the Citizens of Halifax with a Military array to prevent them from trespassing on the Glacis of the Citadel for the purpose of walking about, or obtaining a view of the Harbour and surrounding country.*[25]

The remainder of the general's letter displayed commendable common sense. Trollope promised to forward Nelson's complaint to the Secretary of State for War and suggested a practical way in which cattle could be kept from trespassing. He gave it as his opinion that "the posts and ropes erected at the angles of the ditch were calculated to attract children and Idlers to the Crest of the Glacis" (Nelson annotated this: "Not so – but ordered to be immediately removed this day"). He promised support "in any measure indispensible to prevent specific damage" but was "unwilling to enter into any measures which may extend contested points with the citizens."

Surprisingly, the Secretary of State for War, when informed of the problem, dispatched detailed suggestions for its alleviation. These were, if anything, even sillier than Nelson's. The secretary suggested the construction of formal walkways, letting the property (apparently on the theory that, if it were fenced for cattle, the populace would be kept off the glacis) and planting trees along the east side of the glacis.[26] Trollope again defended the existing situation.[27] He noted that the slopes were too steep to allow walks to be built; that the CRE had prevented the leasing of the glacis; and that both the walks and the planting of trees would interfere with the fortifications. He hinted delicately that trees presented an additional problem:

> *the Glacis is contiguous to an extensive locality styled "Barrack Street" or "Top Street," which contains numerous houses the special resort of Sailors from the Fleet, opposite to which a plantation of Trees would be anything but an advantage to the Inhabitants who might be shocked by scenes not now under their observation.*

Trollope was concerned that the adoption of the secretary's suggestions might weaken the War department's claims to control of its land, and concluded with an assessment of the situation between the town and the garrison on the subject:

> *concessions to the Inhabitants . . . would not be adviseable in Halifax, where a very encroaching spirit exists on the part of the Corporation, who in my opinion would not be conciliated by it but on the contrary they would consider their rights over the principal work of the place had been admitted, whilst if the rights of the War Department in essential points be maintained no doubt exists in my mind that a good understanding will remain undisturbed.*

Throughout the whole business, Trollope displayed a good deal of common sense which, unfortunately, was entirely lost on Nelson's literal mind. The colonel simply paid no attention to the general and continued to try to get his own way. Having failed to defeat Trollope by direct assault, he resorted to all the strategems available to an engineer launching a long siege. He sapped, mined, made surprise attacks and patiently waited.

Nelson's next approach was through the War department's solicitor, Mr. J. W. Ritchie. Because of the court battle with the city, the two men had been in almost constant communication for a year, and in December Nelson formally requested an opinion on the subject of the glacis. The violent exaggeration in his letter is typical of the man.

> *The Glacis is legally protected from trespass by the post and rail fence all arount* [sic] *it: but it affords no physical impediment to those who choose to get over it at any point.*
>
> *Such "physical impediments" as substantial palisading, high walls, etc. would be prejudicial to the Defence, and planting Sentries all*

round would be a heavy demand on the Garrison. –

If the present system of unrestricted trespass is permitted, where will it stop? Or how can it be stopped without legal proceedings, or point of bayonet?[28]

All this was for the benefit of the gallery; Nelson knew that the letter would ultimately be forwarded to London. The actual question he posed was whether or not access to the glacis could be granted to the citizens "under such restrictions that they can be excluded whenever the interest of the Service shall require it."

It is at this point that one begins to have one's doubts about Nelson. It seems inconceivable that any educated man, especially one who had been through a year of litigation about trespass, could seriously have asked such a question. The answer, of course, was yes; the War department could refuse access to the glacis whenever it chose, and could prosecute anyone who failed to obey.[29] Nelson *must* have known the answer before he wrote. Why, therefore, had he taken the trouble to ask? Was it another device for getting Trollope to reconsider the matter, and if so, for what purpose? Nelson was, by now, in the unenviable position of being at loggerheads with the citizens, Trollope and the War department all at once. If he went through the motions of besieging Trollope, it was to no purpose: he was himself under siege.

Surprisingly, Nelson's letter to Trollope enclosing his correspondence with Ritchie was relatively restrained. The colonel blustered on for a few paragraphs, complained that Ritchie's reply threw "not one fresh ray of light on the subject" and concluded with a few comparatively sensible (if complicated) suggestions.

1. To exclude the public altogether from the finished portions [of the glacis] *by means of a light hurdle fencing. . . .*

2. To put up notices that all found within those fences will be certainly prosecuted.

3. To put up notices that the casual use of the unfinished portions of the Glacis until further warning will be fully permitted, but will be withdrawn as the work progresses.

4. To legitimize at once the very convenient footpath leading across the N.E. of the Glacis . . . by wickets, to be closed annually with all thoroughfare granted on sufferance.[30]

Trollope concurred with the last suggestion. He recommended against the fences suggested in the first, since they would lead to "no other effect than to excite boys to climb and leap on them." He noted that, in his opinion, the citizens had done no real damage to the glacis and that the newly built portions could be easily protected, and recommended that the glacis be leased immediately for sheep pasture.[31] With the last suggestion, Nelson strongly disagreed.

The controversy now moved into its penultimate stage. The two aspects of it – the dispute with the Fortifications department about funds and alterations, and the dispute with Trollope about the manner of protecting the glacis – converged. Since the annual estimate had to be approved by the General Officer Commanding, Trollope had known about Nelson's dispute with London since its beginning, but had held his tongue. He proceeded to intervene, whether because London prodded him to do so or because of his exasperation with Nelson's goings-on is not certain from the surviving correspondence. Trollope's intervention took the form of two questions, forwarded to Nelson by Colonel Fordyce.

I am to inquire from you whether the form of the slopes of the Glacis of the Citadel contemplated and arranged by Colonel Stotherd has not been departed from by you, and if so, I am to require you will report . . . the authority or reasons under which you acted in any deviation you may have made.

I am further to inquire . . . whether Colonel Stotherd did not cart a large amount of earth in 1858 to the West Slopes of the Glacis with a view to carry out his project, and whether you did not cause that earth so deposited to be carted to another

> *part of the Glacis, viz. to the very part or thereabouts from which it had been originally procured.*[32]

It was a brilliant stroke on Trollope's part. Nelson was finally obliged to defend his actions since his arrival in Halifax, first to Trollope and then (since the latter promptly forwarded the correspondence to London) to Burgoyne. Having lost the initiative, Nelson never quite regained it.

Nelson's response to Fordyce's questions was more than a little arrogant. Yes, of course he had altered Stotherd's plans; Nelson had "differed from him as to our common end – i.e. the formation of the most effective glacis." In any case, "each CRE is responsible to the IGF – not to his predecessor." Yes, he had removed the earth, but he "did not know from whence it was taken" in the first place. As for his authority for his actions, he invoked "the discretionary power and latitude indispensible to the execution of a large project." He trusted that his explanations would be sufficient.[33]

Unfortunately for Nelson, they were not. In the first place, he had *not* consulted Burgoyne about alterations in Stotherd's plans; he had merely indicated that some alterations might be desirable. In the second place, General Trollope had been perfectly correct in his recollections of the strange travels of the fill. In forwarding Nelson's explanations to London, Trollope indulged in a little sarcasm.

> *I think it cannot be doubted that the public money has been wasted to a considerable amount in the labour and transport applied to cart an immense quantity of earth from a particular spot for a particular purpose in 1858, and to the removal of it back again in 1859.*
>
> *I think it improbable, if not impossible, that Col. Stotherd and Col. Nelson, could both have been right in the courses taken by them.*[34]

For the rest, Trollope exercised restraint; but his letter was sufficient to rouse the Inspector General to action. Nelson was called upon, both to explain his actions and to provide detailed plans of the glacis.

Nelson complied in two letters dispatched in August 1860. In the first he enclosed plans showing, among other things, the location of the earth he had moved in the summer of 1859.[35] In the second he defended his actions. The second letter is, unfortunately, couched in terms of a plan which has not been located and is in consequence almost impossible to understand. But the basis of Nelson's self-defence is clear enough.

> *The whole question amounts to about this – Was the original work carried out? I do not know what the original design . . . was, nor do I believe that any such detail had been decided on: the ground was rough and* I followed the course I found established [emphasis his] *of bringing things into shape as best they might be.*

It ought to be noted that this argument is somewhat different from the one Nelson had advanced earlier in answering Trollope's two questions. It raised the whole question of the original design of the glacis, and indeed whether one had existed at all (in all probability it had not) and it paved the way for a new project for its completion, to be included in the next annual estimate.[36] This was what Nelson had wanted from the beginning, and it seemed for a few months that Trollope's intervention in the purely technical side of the problem would ultimately lead to the colonel's getting (at least partly) his own way.

The new project was duly dispatched as an appendage to the Fortifications annual estimate for 1861–62.[37] In it, Nelson estimated the expenditure for completing the glacis at £5,217, of which he proposed to ask for £980 in the coming year. Anyone intimately acquainted with the history of the Citadel could have predicted the outcome of such a suggestion, but Nelson seems to have been genuinely surprised when the Inspector General's office baulked at the additional expense. The Inspector General's letters to Nelson on the subject are not available, but Nelson's replies to them are long and detailed. "Your letter of November 16th . . . went into

38 The Citadel, 1950. This aerial photograph was taken just before the army finally gave the Citadel up. The fort had come to look like a tumble-down anachronism in the centre of modern Halifax. (*Public Archives of Canada.*)

considerable detail of scrutiny," he wrote to Burgoyne on 8 January 1861, "as if evidently surprised at the estimated cost of completing the Citadel Glacis."[38] He went on at length to defend his calculations, noting that they were based both on wide experience with such things and on his observations of the work done under his command since he had arrived in Halifax. He concluded, "I beg respectfully to decline the responsibility of recommending you to undertake the work for less." In the matter of detailed calculations, Nelson was, in all probability, unassailable. After all it was one of his strongest points, and in tackling the technical aspects of the problem head-on, he at least displayed some of the common sense which had been so conspicuously absent in most of his earlier letters on the subject.

Since Nelson could not be budged on the issue of costs, the Inspector General tried a different tack. Could not the problem of dead ground be solved by placing more guns on the ramparts? Nelson replied,

> *I beg to remark . . . that* [the new proposals] *introduce new matter altogether, without producing any reduction in the cost of the Glacis.*
>
> *The greatest number of the suggestions as regards an increased armament . . . are practical and advisable; – a conjoint report by the Commanding Officer of Royal Artillery and myself will be forwarded by the next mail.*[39]

He went on to demonstrate that additional armament, by itself, could not resolve the problem of dead ground at various points on the glacis, and marvelled that such a glaringly obvious difficulty could have been so completely ignored in the original designs for the work. He stated again that he could not agree to anything less than what he had proposed in his estimate; anything else would be inadequate for the fortress. He did make one surprising admission:

> *All this* [the new armament] *, however, as referring almost exclusively to the upper and therefore finished part of the Glacis in no wise reduced the expense of proper completion of all that remains below: neither the Commanding R.A. nor CRE, sir, can venture on the responsibility of recommending aught else than the reduction of the generally very rough ground all round to true surfaces, so that whether the guns can be depressed sufficiently or not, still there shall be no swells, no banks, no cover for riflemen.*

If Nelson had had any subtlety at all, one could see in this statement the possibility of a compromise. If the upper parts of the glacis were complete, would it not be possible to smooth the rest so that there would be no glaring errors, and leave the matter at that? Whether or not such was Nelson's intention, it seems very likely that this was the course which was ultimately adopted – a difficult contention to prove, since there is almost no documentation on the subject.

This exchange marks the last major appearance of the glacis in the Citadel correspondence, and the £500 which was finally allowed for the glacis in the 1861–62 estimate was the last major grant of money. A year later, Nelson's successor, Colonel Westmacott, was content to spend a mere £200 for maintenance,[40] and in the estimate for 1863–64, only £400 was allotted for repairs.[41] In the following year, this sum dwindled to a trifling £50;[42] thereafter it disappears from the estimates altogether.

As for Nelson, his last year in Halifax was marked by the absence of serious controversy. He resigned on 25 July 1861,[43] probably because of ill-health. It is difficult to assess his contribution to the Citadel with any fairness. There is no doubt that, at bottom, he was justified in his complaints about the glacis and sound in his proposed solutions. Unfortunately, both his methods and his attitudes (especially toward the Halifax civilians) were entirely unsuited to his position. One emerges from his correspondence with the feeling that he may have been a little mad. Although he muted his complaints about trespassing after his noisy collision with Trollope, he apparently maintained his rigid convictions right to the end of his stay in Halifax. In one of his letters to Mr. Ritchie, Nelson tried to get the solicitor to prosecute the owner of a cow he had caught trespassing on the glacis. "Mr. McCully's cow is an old offender;" he wrote, "She may be a good 'fencer': – I have seen a cow take the railing round the citadel at a clean bound; – cleverly."[44] There is no record of Ritchie's reply. But then, what could he have said?

Epilogue

I

In the summer of 1860, a modest proposal for the rearmament of the Citadel and several other works in the Nova Scotia command was put forward by Colonel Nelson and Colonel Benn, the CRA.[1] It was rejected by Major General Trollope, who maintained that the existing armament was perfectly sufficient and that any alteration would be a waste of money.[2]

Not everyone would have agreed with him. That same summer the Citadel received its first distinguished visitor, Albert Edward, Prince of Wales. Among the people accompanying him was an English journalist who left this impression:

I was told that [the Citadel] *was a very strong place and, as a patriotic Englishman, I am willing to believe that all English Citadels must be strong places. It seemed to me, however, that as a rule the calibre of its ordnance was very much lighter than it should be to keep pace with the recent advances made in the use of heavy guns. It is curious to contrast how the Admiralty arm our vessels of war with the heaviest ordnance (often too heavy for the men to handle), while in many of our forts and citadels the guns are, for the age, ridiculously light. This is all the more strange when we remember that a great weight of metal is often a serious drawback in a ship; it can be none in a fortress.*[3]

"The recent advances made in the use of heavy guns" – this was one instance of a civilian displaying more military acumen than a general. The whole technology of armament was indeed changing, and it would not be long before such developments affected the future of the Citadel.

II

During the first half of the 19th century, before the Crimean War, British military technology made no noticeable advances. Fortifications theory as taught to British engineering students had not changed appreciably since the early 18th century; young engineers were still learning Vauban's principles of construction. They were rarely taught to evaluate – or even to keep up with – European developments in design. The stagnation shows up most clearly in the publications of the Corps of Royal Engineers. The essays on military engineering in the *Professional Papers* tend to be of two sorts: systems of fortifications, usually dreamed up by junior officers, and discussions of new works being built in Europe. The contrast between the two is striking. The systems of fortifications outlined in the *Professional Papers* are elaborate, cumbersome and completely impractical compared to the modern European ones which are discussed (usually uncritically and with no great military judgement) in the same pages. The new theory featured polygonal works with simplified traces and extensive subterranean casemating. But British engineers continued to work from the old principles and to decline to learn from the new, and in so doing, stagnated.

Three factors were responsible for a change in this state of affairs. First, the disasters of the Crimean War had undermined the prestige of the British army; no longer was the threat of war much of a deterrent to European powers. Second, the advent of ironclads in the late 1850s made Britain more vulnerable to invasion, and as a result, forced the British to look for the first time since 1805 to the state of their permanent fortifications. (On 20 August 1859, a royal commission was established to examine the defences of the United Kingdom. It reported in the following February, recommending the construction of an extensive system of seaward defences at the major ports.[4]) Third, gunnery had been transformed.

Guns had been getting heavier for some time. At the beginning of the 19th century, the heaviest gun in normal use was the long 32-pounder; by 1856, 68-pounders were common.[5] By 1860, moreover, the impact of a qualitative change was beginning to make itself felt. The British had used rifled guns with satisfactory results at the siege of Sevastopol,[6] and thereafter the techniques of rifling improved rapidly, with marked results for the defensibility of the Halifax Citadel.

In 1860, the very year in which Trollope pronounced himself satisfied with the ordnance in his command, a new note was sounded in the pages of the *Professional Papers*. An essay entitled "Remarks on Fortification, with especial Reference to Rifled Weapons" by Captain Henry Whatley Tyler, RE, recorded the first attempt (in print, at any rate) by a British engineer to come to terms with the new developments.[7] Tyler was uncertain about the extent to which rifled weapons would affect the efficiency of fortifications, but of one thing he *was* certain: a change in design was inevitable. His own designs, contained in the article, were cleaner and simpler than most, although they were still too complicated to be really practical. His basic premise, that *"systems of fortification"* must give way to *"principles of construction;* and . . . *systems of defence* [emphasis his] " was prophetic. He had correctly divined the future of fortifications.

The same volume of the *Professional Papers* also contained an article by Burgoyne's assistant, Major William Francis Drummond Jervois, an eminent engineer, concerning the defence of naval ports.[8] Although he hardly mentioned rifled ordnance, Jervois did refer several times to Tyler's article, and his proposed system of fortification resembled Tyler's. Jervois's detached forts, narrow ditches and casemated guns all were suited to resist rifled artillery.

In the following year (1861) Burgoyne himself entered the discussion with an article in the *Professional Papers* on the breaching power of rifled ordnance.[9] Burgoyne's arguments were based on the results of a test conducted with rifled guns on an obsolete Martello tower. His conclusions were conservative. He admitted the superior range and accuracy of the new guns but doubted their usefulness except against "works that have always been considered avowedly defective," those which were "subject to being breached at all, at any influential parts, from a distance." He concluded that any well-protected work (that is, one with fully covered escarps) would suffer no more damage from rifled guns than from smoothbores.

The drawings accompanying Burgoyne's article, however, must have been enough to give any engineer pause. They showed the Martello tower in successive stages of breaching. After only 40 rounds fired from a distance of more than 1,000 yards, one side of the tower was virtually demolished. A second article in the same volume of the *Professional Papers* confirmed the evidence of the drawings and cast doubt on Burgoyne's conclusions. Lieutenant Colonel Archibald Ross, RE, had been present as an observer when the Prussian army used rifled ordnance to destroy the obsolete fortress of Juliers in September 1860. Ross's article in the *Professional Papers* examined the results of the Prussian experiment.[10] In one sense, his conclusions supported Burgoyne's: smoothbores, with their high initial velocity, were indeed more effective against fortifications at short range. On the other hand, rifled artillery succeeded in breaching an unseen escarp at a distance of 640 yards. A table accompanying the article made the point dramatically clear. Smoothbore artillery, firing at a wall from 500 yards, needed 660,100 pounds of projectiles in order to effect a 100-foot breach. Rifled artillery, firing from 640 yards, needed only 3,504 pounds to effect a 32-foot breach. Even allowing for the difference in walls – the first was stronger – the conclusion was inescapable.

III

After the debut of rifled ordnance, the Citadel and its armament had to be seen in a different light. The fortress was not designed or constructed to stand up to rifled artillery and was therefore incapable of fulfilling its original role as a landward defence. Because it had always had a secondary role, as a support to the harbour defences, it came to be regarded as an adjunct to the new, powerful work being built on Georges Island. Even the adaptation of the Citadel to its new function, by rebuilding the harbour faces to provide crossfire with the island, was almost immaterial; the various plans for rebuilding were held up so the available money could be used for other works. The change in emphasis was, in fact, a tacit admission on the part of the engineers concerned that the Citadel was outdated.

The British government was to spend even more money in the years to come on rearming, repairing and maintaining the fortress until 1907, when it was finally handed over to a bemused and uninterested government of Canada. Whatever the Royal Engineers might have thought of it, in the popular imagination the Citadel was the bulwark of Canada's Atlantic defences, the great fortress of Halifax, the very apogee of fortifications, rivalled only by the defences of Esquimalt on Vancouver Island. Colonel Nicolls had been right in a sense; his work was a monument to flag-waving. It was also a memorial for the Board of Ordnance.

But in the 1860s, it began to dawn on the engineers that flag-waving was the fortress's only *raison d'être.* The Citadel had cost more than a quarter of a million pounds; it had taken 25 years and more to build, and had strained the abilities and intelligence (and, one suspects, the sanity) of a generation of engineers. Nevertheless, when armies discovered the military benefits of rifling and the whole world of armaments experienced the consequent revolution in gunnery, one fact emerged. In spite of the money and labour which went into its building, the Citadel was completely and permanently obsolete.

Appendix A: Ordnance Staff and Officers Commanding at Halifax

The question of rank in the Ordnance is confused by the fact that senior Ordnance officers also held regular army rank, and by the fact that Ordnance ranks stop at Colonel Commandant. Very senior Ordnance officers (like Gother Mann or John Fox Burgoyne) are given their army ranks in this appendix; relatively junior officers (like Colonels Jones, Savage, Boteler and so forth) are given their Ordnance ranks. Carmichael Smyth, for example, was a lieutenant colonel in the Corps of Royal Engineers and a colonel in the army simultaneously. It should also be pointed out that each officer is given his rank at the date of his appointment; Nelson was a lieutenant colonel when he was appointed CRE at Halifax and became a full colonel somewhat later. Army officers are, of course, given army ranks.

Masters General of the Ordnance, London, 1819–55

Arthur Wellesley, 1st Duke of Wellington	1819–27
Henry Paget, 1st Marquis of Anglesea	1827–28
William, 1st Viscount Beresford	1828–30
Sir James Kempt	1830–34
Sir George Murray	1834–35
Richard, 1st Baron Vivian	1835–41
Sir George Murray (2d term)	1841–46
Lord Anglesea (2d term)	1846–52
Henry, 1st Viscount Hardinge of Lahore	1852
Fitzroy Somerset, 1st Baron Raglan	1852–55

Secretary to the Board of Ordnance

Richard Byham	1827–50

Inspectors General of Fortifications, 1811–68	Appointed
Lieutenant General Gother Mann	23 July 1811
Major General Sir Alexander Bryce	10 April 1830
Major General Robert Pilkington	24 October 1830
Major General Sir Frederick W. Mulcaster	16 July 1834
Major General John Fox Burgoyne	17 July 1845

In 1862, the office was changed to:

Inspectors General of Engineers and Directors of Works

	Appointed
General Sir John Fox Burgoyne	27 September 1862
Major General Edward Frome	20 January 1868

Deputy Inspectors General of Fortifications	Appointed
Major General Sir Alexander Bryce	2 December 1814

(This office was abolished when Bryce became Inspector General on 10 April 1830.)

Assistant Inspectors General of Fortifications, 1814–62

	Appointed
Lieutenant Colonel Cornelius Mann	1 November 1814

(After 1830 there were two Assistant Inspectors General.)

Lieutenant Colonel Edward Fanshawe	30 April 1830
Captain John Wells	30 April 1830
Lieutenant Colonel Alexander Brown	4 August 1842
Lieutenant Colonel Ralph Anderson	1 July 1844
Captain Henry Sandham	11 March 1848
Colonel George Harding	1 October 1850
Lieutenant Colonel John Walpole	5 February 1850
Captain Robert Laffan	30 May 1855

Major William F. D. Jervois	8 April 1856
Captain Edward Balfield	November 1856
Captain Douglas Galton	31 December 1859

In 1862, the office was superseded by that of:

Deputy Director of Works (Fortifications)

	Appointed
Lieutenant Colonel William F. D. Jervois	5 September 1862

Brigade Majors of the Corps of Royal Engineers, 1821–46

	Appointed
Captain Charles Ellicombe	9 January 1821
Captain Edward Matson	25 July 1842

In 1846, the office was superseded by that of:

Assistant Adjutants General

	Appointed
Lieutenant Colonel Edward Matson	15 June 1846
Lieutenant Colonel Frederick A. Yorke	17 December 1855
Captain Edward Stanton	1 August 1858
Lieutenant Colonel Hussey F. Keane	1 July 1861
Colonel James F. M. Browne	1 January 1866

Deputy Adjutants General of the Corps of Royal Engineers, 1855–66

	Appointed
Colonel Edward Matson	1 July 1855
Lieutenant Colonel John W. Gordon	18 October 1856
Lieutenant Colonel Frederick E. Chapman	1 September 1860
Lieutenant Colonel Hussey F. Keane	1 January 1866

General Officers Commanding in Nova Scotia, 1855–73

Major General Sir John Gaspard Le Marchant	1855–57
Major General Charles Trollope	1857–61
Major General Sir Charles Hastings Doyle	1861–73

Commanding Royal Engineers in Nova Scotia, 1818–71

Lieutenant Colonel James Robertson Arnold	1818–25
Colonel Gustavus Nicolls (2d term)	1825–31
Lieutenant Colonel Richard Boteler	1831–33
Captain Loyalty Peake (acting)	1833
Lieutenant Colonel Rice Jones	1833–42
Lieutenant Colonel Patrick D. Calder	1842–48
Lieutenant Colonel Henry John Savage	1848–54
Lieutenant Colonel Richard John Stotherd	1854–58
Lieutenant Colonel Richard John Nelson	1858–61
Lieutenant Colonel Spencer Westmacott	1861–66
Lieutenant Colonel Richard Burnaby	1866–71

Appendix B: The Trace

The evolution of the trace can be divided into three periods. In the first, Colonel Nicolls formulated his initial design, and, after some experience with the construction, altered parts of it. In the second, Colonels Boteler and Jones and Captain Peake re-designed much of the work, and after a lengthy and complicated series of events, succeeded in settling the general outline of the fort as it now stands. In the third period, Colonels Calder and Savage made suggestions to improve the design still further, and succeeded in making many alterations.

Nicolls's original design was for a fort in which the opposite fronts were identical. There were four demi-bastions of the same dimensions; two curtains (east and west) and four ravelins, one opposite each front. The whole was surrounded by a ditch bounded by a counterscarp and by a gallery containing casemates of reverse fire, opposite the four bastion salients. Countermines were placed at regular intervals along the gallery.

The interior of the fort, because of its shape, was cramped. A large portion of the available space was to be taken up by two cavaliers and the powder magazine. The latter, a survival from the previous fort, was located at the southern end of the east curtain. The two cavaliers were both to be in the north end of the fort. They were to be of identical size, each containing seven two-storey casemates, and were to face west and north.

Beneath the ramparts, Nicolls placed 16 casemates of defence in pairs, two flanking each of the ravelin ditches. These were intended primarily for defensive purposes, although they could also be used for accommodation and storage.

The western ditch was flanked by a caponier which led from the west curtain to the guardhouse in the gorge of the ravelin opposite. This ravelin was flanked by two rudimentary places d'armes, one above each counterscarp re-entrant.

Nicolls proposed three major alterations to this basic scheme. On a suggestion from the Assistant Inspector General of Fortifications, he rearranged the cavaliers, placing three of the casemates intended for the north cavalier in the south end of the fort, and leaving the remaining four in their original location. He altered the trace of the northern front slightly to allow the inclusion of an old well within the bounds of the fort. This was the origin of the asymmetrical shape of that front and the off-centre re-entrant angle of both the front and the ravelin opposite.

Nicolls's most radical alteration was his proposal for a redan on the eastern front. This was also at least partly out of consideration of the water supply, since it allowed yet another old well to be included in the body of the fort.

The disasters of the early 1830s led to a re-examination of the whole design. When the controversy was finally settled in 1838, fundamental changes had been made. The north and south cavaliers, the caponier and the places d'armes were all discarded. The counterscarp gallery and the ravelin guardhouses were redesigned. The casemates of reverse fire were abandoned and only half the countermines (those on the north and west fronts) were retained. The old magazine was judged unfit, owing to its location and height, and replacement magazines were designed for the gorges of the western bastions.

The most fundamental change was the introduction of dwelling casemates. Of Nicolls's original 16 casemates of defence, 4 had disappeared with the introduction of the redan. To the 12 remaining were added another 26, including 12 two-storey dwelling casemates in the redan. The west cavalier was retained, but was slightly re-designed to include cooking casemates at each end.

After 1838 there were no essential alterations to the shape of the fort. In 1843 Colonel Calder added a number of features, including 19 casemates, storage cellars (under the redan), the magazine porches and the rooms over the cavalier cooking casemates. He also redesigned the roofs of the magazines and ravelin guardhouses.

In a later estimate (1846) Calder attempted to provide for the services needed for the proper functioning of the fort, including tanks and drains for the water supply, lightning conductors for the magazines, and flagging for the magazine areas. These proposals were, in the end, all altered to meet changing conditions. The whole of the water supply system, for example, was changed several times before the final version, a complicated system of drains and storage tanks, was installed in the early 1850s.

Calder's final contribution to the site was a major re-designing of the west ravelin, which, because of earlier collapses, had to be rebuilt. At this time (1846) the final form of all three ravelins was settled. The guardhouse ditch was the most important addition Calder made to the two existing ravelins.

After 1850, all changes were made in response to the needs of the moment. The final version of the cavalier roof and chimneys, for example, was arrived at in a desperate attempt to keep the barrack space in the building dry.

Appendix C: Cavalier

The present cavalier is one of three originally planned for the Citadel. It was begun in 1830 and was virtually complete by 1832. In its initial form it consisted of seven two-storey casemates surmounted by a parapet and terreplein, with positions for seven 24-pounder guns on traversing platforms.[1] The front of the building was provided with a two-storey colonnaded verandah, open at both ends.

In the course of the 1830s, several alterations to the original design were proposed. The alterations finally accepted were detailed in Colonel Jones's revised estimate.[2] These consisted of four small casemates placed in pairs at each end of the building at right angles to the existing casemates. The purpose of these additions was twofold: to provide the cooking facilities needed for the garrison, and to "give the additional support [the cavalier] appears to require before it can be safely loaded with its Terreplein, or guns mounted on it."[3] The verandah was extended to include the additions, and the verandah staircases were moved to each end.

Final approval for the provisions of Colonel Jones's revised estimate was not forthcoming until the summer of 1838, and the additions were not actually constructed until 1840–41. In the meantime, a temporary wooden roof was constructed, apparently to keep the body of the building from being damaged too much by the weather. There exists no documentation whatever for this roof, but it was apparently a hipped shingle roof.

In Jones's plan for the end casemates, the space above the casemates had been left unfinished, apparently for use as storage. In 1846, Colonel Calder proposed to use this area for accommodation and prison cells.[4] The space over the south casemates was to be fitted up as a suite of three rooms (quarters for the Director of Signals and the Regimental Sergeant Major and an orderly room) and the space over the north casemates as cells for solitary confinement. The latter consisted of six arched cells linked by a corridor. Access to both ends of the cavalier was by means of a door leading to the verandah stairwells.[5] Calder's proposal was approved, and the additional rooms were constructed around 1847.

As long as the Citadel remained incomplete, no one gave much thought to the problem of preparing the cavalier for its armament. Down to 1846, the only covering of the dos d'anes was the glazed tiles provided for in the original estimate. These were inadequate either to bear the weight of the terreplein earth and the guns, or to keep the casemates underneath staunch. As long as the building was covered by a timber roof, no problems arose, but it was obvious that this state of affairs could not continue indefinitely. When Calder framed his armament proposal in 1846, the problem became urgent, and he inserted an item in the 1846 supplementary estimate for completing the platform and building the curbs for the traversing platforms.[6] The dos d'anes were to be covered with ironstone flagging laid in roman cement, and the terreplein filled in with earth and broken stones.

The cavalier was thus provided with the same type of dos d'ane covering as the rampart casemates, and with the same result: it leaked. In the end, all the expedients tried on the rampart casemates were also used on the cavalier, including counterflagging, alterations in the drainage system, and, ultimately, asphalt. At some point, presumably around 1850, the timber roof was removed, making the problem even worse. Exposed to the elements, the cavalier leaked like a sieve, partly as a result of the inadequacy of the staunching expedients, and partly, one supposes, because the masonry of the building had been neglected for almost 20 years. By 1854 the casemates were uninhabitable because of the damp, and serious consideration was being given to a proposal to tear the building down altogether.[7] The Ordnance department would not, however, allow such a drastic step. In the end, Colonel Stotherd installed a permanent timber roof. As it extended to the edge of the parapet (the earlier temporary roof had apparently only covered the terreplein) it interfered with the workings of the chimneys and these had to be raised.[8]

Stotherd's alterations severely affected the utility of the cavalier as a gun platform. The armament had been mounted in 1853, but the addition of the permanent roof and the raised chimneys made it impossible to fire the guns. Indeed there was some doubt expressed as to whether the guns *could* be fired safely. Although the 1856 committee claimed that the guns could be worked, no one seems to have had the courage to find out.[9] The armament remained in place at least until 1860, and possibly until much later.

I have not been able to ascertain when the cavalier was first occupied as a barracks. There are suggestions in the correspondence that there were soldiers quartered there as early as 1845, and it was certainly occupied by 1848. An estimate was submitted in September 1854 for re-positioning the casemate stoves for greater warmth.[10] Two months later, the casemates were pronounced uninhabitable because of the leakage, but the permanent roof, installed in the summer of 1855, and the repointing of the masonry carried out at the same time effected a substantial improvement. A second inspectional report, dated June 1856, states that the building was only slightly damp, and anticipates further improvement.[11] At this time the cavalier housed 280 NCOs and privates, as well as a staff sergeant in the rooms over the south cooking casemates.

In 1875–77, the top of the cavalier was converted into a barracks. This radically changed the shape of the building. The rooms over the north end casemates were altered to provide access to the new top storey, and the height of the roof was raised. It would seem that the gun platform was altered only by the removal of the guns (if indeed they had not been removed earlier). The tops of the casemates were filled in to provide a level surface which was then floored over. The curbs and pivots were left in place. At least some of them are still there.

Appendix D: Magazines

In 1812, Gustavus Nicolls, then only a captain, received permission to build a stone powder magazine within the crumbling walls of the third citadel. Thirteen years later, when Colonel Nicolls drew up his plans for the present Citadel, he retained the old magazine within the new fort. Although the magazine was inconveniently located and was, in fact, higher than any part of the ramparts, Nicolls's desire for economy prevailed over any other consideration.

It was not until after Nicolls left Halifax that anyone questioned the wisdom of his decision. In his first report to London, Colonel Boteler condemned the building as being too small and dangerously situated.[1] When he drew up his estimates for the completion of the Citadel in the autumn of 1832, he provided for the construction of new magazines. In his first estimate, Boteler submitted a design for two magazines, one in each of the western bastions. Each magazine consisted of a pair of subterranean casemates.[2] In his second estimate, which was drawn up as an expression of his own personal preferences, he modified this somewhat. Only one of the magazines was, he felt, absolutely necessary, and he proposed to place it in the southwest bastion.[3] The cost was estimated at £3,128 4s. 3/4d. for one or £6,256 4s. 11d. for two.

Captain Peake, who succeeded Boteler, was not convinced that the old magazine needed replacing. In his set of estimates, drawn up early in 1833, Peake provided only for a retaining wall for the old magazine.

arguing that the wall would be sufficient to make the building convenient and safe.[4] Peake, like Nicolls, put considerations of economy before everything else. In any case, he was merely a junior officer, and his opinions carried little weight with the Fortifications department. The necessity of replacing the old magazine was accepted, and it was left to Colonel Jones, Peake's successor, to draw up the final estimate.

Jones was initially inclined to follow Boteler. The first version of the revised estimate (1834) repeated, almost verbatim, the proposal for two casemated subterranean magazines.[5] This, however, did not satisfy the Inspector General of Fortifications, who thought that it would be impossibly difficult to ventilate a subterranean magazine properly.[6] Jones eventually substituted a design for two above-ground magazines, each enclosed by an area wall and located in the gorge of one of the western bastions.[7]

The Inspector General had one major reservation about the design. He thought it unnecessary to buttress the magazine, and requested that the estimate be once again revised.[8] Jones made the necessary revision, and submitted the estimate for the third time in December 1836.

The final design called for two identical, arched, bombproof magazines, each entered by a door in the south end of the building.[9] The design was approved in 1838, and the buildings were constructed in the early 1840s. Colonel Jones's successor was not, however, entirely satisfied with them. In his 1843 estimate, Colonel Calder proposed the addition of north-end doors, porches and shifting rooms.[10] At the same time, he proposed to renew the magazine roofs; they had been covered with tiling laid in cement, but this arrangement had failed.[11]

Calder's proposals were accepted, but work had still not begun on the alterations when Calder sent in his second supplementary estimate in March 1846. In this he brought forward two incidental services for the magazines and areas: the addition of lightning conductors for the magazines and flagging of the areas.[12] The former was accepted, but the Inspector General suggested the substitution of asphalt for flagging as paving in the magazine areas.[13]

As work was beginning on the alterations to the new magazines, the history of the old (1812) magazine came to an inglorious end. By the spring of 1847, it looked a little forlorn, sitting incongruously on top of a miniature hill, ten feet above the level of the parade. On 7 April it was demolished.[14]

By 1850, all the alterations and additions proposed in Calder's two estimates had been carried out. Two of them had not been particularly successful. The asphalt, which had been applied to part of one of the areas in the autumn of 1849, proved to have little resistance to the ravages of the Halifax winter. It cracked every time the temperature fell below freezing.[15] The lightning conductors refused to stay attached to the building.[16] Other problems, however, were of greater importance at the time, and neither matter was attended to for several years. Indeed, despite the gloomy initial report on the usefulness of asphalt, the north magazine area was asphalted annually in the early 1850s. There is no indication that the same was done to the south magazine area.

In the course of the 1850s, several further alterations and renewals became necessary. In the autumn of 1852, the floor of the north magazine failed and had to be rebuilt. (Apparently there were no alterations made in the structure of the floor at that time, although it is difficult to be certain because the estimate for the service has not survived.) In 1853, the floor of the south magazine was similarly renewed.[17] At about the same time, the arrangement of the powder racks was altered in both magazines.[18] Finally, in 1859 a proposal was put forward for the installation of adequate lightning conductors in the Civil Buildings Estimate for 1859–60. The proposal was accepted.[19]

There were apparently no further major alterations to either of the magazines until the late 1890s. By then, neither was of much importance to the garrison, and a proposal to convert the north magazine into a canteen was accepted and carried out.[20]

Appendix E: Casemates

The first problem to be overcome in any discussion of the casemates in the Halifax Citadel is that of determining their number. In fact, one could make a case for almost any number of casemates, from 54 to 80, depending on one's definition of the term. "Casemates" may be stretched to include almost any arched masonry structure; the seven arched rooms in the cavalier are considered casemates, and the three ravelin guardhouses are invariably described as "casemated defensible guardhouses." Even the six storage cellars under the parade square in the redan have the same basic structure as the casemates. At the other extreme, a really narrow definition of the term would exclude a number of the arched structures under the ramparts – the privies, for example, or the shifting rooms. For the purposes of this report, any arched structure found beneath the ramparts will be treated as a casemate. This gives a total of 60, counting the three privies, the shifting rooms, the small casemates in the redan re-entrants, and the two small arched rooms off the western sally ports.

The second problem arises when one attempts to devise a numbering system to encompass all 60 casemates. There have been at least three numbering systems in use since the first was devised in the late 1840s, and all of them are, in some ways, inadequate. No two of them arrive at the same total, and all leave some casemates out. The system currently in use is perhaps the best, but even it has some anomalies. It has, for instance, a casemate No. 0, completely ignores the casemates of defence in the western bastions, and for some reason numbers the shifting rooms as 6A and 15A. Early in my research, it became obvious that a comprehensive system was necessary, and, at the risk of making an already complicated situation worse, I devised a numbering system of my own, which I use throughout this report. It utilizes Nos. 15 through 50 of the previous system and re-numbers the remaining 23. Numbering is consecutive, going clockwise from the southernmost casemate in the curtain. Even this system has one anomaly: I mistakenly numbered the privy off the north end of the northern sally port in the curtain and the small room behind it as 7A and 7B respectively. In fact, as I discovered later, the two are entirely separate entities, having been built at different times. However, rather than alter all the numbering used in the report, I leave the system as it is. Following is a comparison of the standard system with that presently in use.

Nos. 1–5 (formerly 7–10 with one unnumbered): South end, curtain.
Nos. 6–11 (formerly 11–4 with two unnumbered): North end, curtain. The first casemate past the sally port (the privy) and the small room behind it are numbered 7A and 7B respectively.
Nos. 12–13 (formerly unnumbered): The casemates of defence in the northwest demi-bastion. No. 12 is the westernmost.
No. 14 (formerly 15A): Shifting room, north magazine.
Nos. 15–23 (numbered as before): North side, northeast salient.
Nos. 24–33 (numbered as before): East side, northeast salient.
Nos. 34–42 (numbered as before): North side, redan.
Nos. 43–50 (numbered as before): South side, redan.
Nos. 51–3 (formerly 0–2): East side, southeast salient.
Nos. 54–5 (formerly 3–4): South side, southeast salient.
Nos. 56–7 (formerly 5–6): South side, southwest demi-bastion.
No. 58 (formerly 6A): Shifting room, south magazine.
Nos. 59–60 (formerly unnumbered): Casemates of defence, southwest demi-bastion. No. 60 is the westernmost.

Building the Casemates

In Colonel Nicolls's original plan for the Citadel, casemates were intended solely for storage and the defence of the ditch. He provided for 16 of them, arranged in pairs, to flank the ravelin ditches.[1] The alterations of the early 1830s brought about two major changes in this plan. In the first place, the decision to build a redan on the eastern front caused the deletion of four of the original casemates (those intended for the eastern curtain to flank the east ravelin) and the addition of eight more casemates of defence to flank the ditch on both faces of the redan and the eastern faces of the eastern salients. This brought the total number of defence casemates up to the present figure of 20.

The second major change resulted from the decision not to build the north and south cavaliers. Additional barrack space was required, and Colonel Jones decided that the best solution to the problem would be the construction of dwelling casemates. The real reason for this change in policy may have been the result of the escarp collapses of the early 1830s. Casemating was one way of taking the loading weight of the ramparts off the escarps, and Jones and the Fortifications department may well have felt that casemating would, in the end, prove cheaper and more efficient than building escarps of a very thick profile.

In all, Jones estimated for 28 new casemates:[2] 12 two-storey casemates in the redan for officers' quarters; eight additional casemates of defence; five storage casemates on the north front; two small casemated privies on the west front; and one small two-storey casemate at the redan salient, the bottom storey of which was also a privy.[3]

As work proceeded on the casemates provided in the revised estimate, Jones's successor, Colonel Calder, decided that even 40 casemates would be insufficient for the needs of the garrison. In January 1843, he proposed that casemating be extended to fill most of the available space under the ramparts.[4] London responded by inviting him to justify the additional casemates.[5] Calder canvassed the other department heads to see how much space they would need in the completed fort, and, on the basis of the information he received, decided that 19 additional casemates were necessary. He formally proposed their construction in an estimate for the completion of the Citadel dated 22 May 1843.[6] He also included in the estimate an item providing for the rebuilding of the area wall of the casemates of defence in the northwest bastion to replace an earlier wall which had collapsed.[7]

As Calder's estimate was being debated, the redan casemates reached completion and it became necessary to provide them with their interior partitions. Unfortunately Jones had neglected to leave a plan of the proposal for the partitions behind when he left. After a lengthy exchange with London, a plan was decided upon, and the partitions were constructed.[8]

The casemates included in Calder's 1843 estimate included four on the west front, two on the north front, seven on the east side of the northeast salient, one in each of the redan re-entrants, two on the south front and two shifting rooms for the magazines. These were brought forward in the Ordnance annual estimate in the years following 1843. The detail provided in these annual estimates was infinitely greater than the brief sketch of the proposed service provided in the 1843 estimate, but unfortunately only the text of the Ordnance annual estimate for 1844–45 has been located.[9]

The new casemates were still in the process of being constructed when Calder submitted his supplementary estimate in March 1846.[10] The casemate provisions of the earlier estimates were reiterated in this document, but no additional information was provided. The only new projects involving casemates were the demolition and rebuilding of the retaining walls of the casemates of defence in the western curtain and the casemates of defence in the northwest demi-bastion.[11]

By 1848, all the casemates were completed.[12] But the problems with them were only beginning. Most of them leaked.

Staunching the Casemates

The Engineer department in Halifax spent almost a decade (1848–56) trying to find a satisfactory solution to the problem of casemate waterproofing. I have already dwelt at some length on the problems involved and the solutions adopted. This section is a brief summary of the earlier chapter on the subject.

The heart of the staunching problem lay in the difficulty of finding a satisfactory covering for the casemate dos d'anes which would shed water. The problem was influenced by three main factors. In the first place, the comparative severity of the Halifax winter, with its sudden thaws, made frost and water damage in subterranean structures a major difficulty. This was further complicated in the case of the casemates by the nature of the drainage system initially adopted to lead the water off the dos d'anes. In fact the only drainage provided was a lead gutter in the troughs between the casemates leading to a gargoyle in the retaining wall and an exposed down pipe. The pipe, needless to say, blocked up at the first frost, leaving the surface water trapped in the rampart earth. To cap everything else, neither the casemate arches nor the dos d'anes were carried very far into the end walls of the casemates. This meant that there was a comparatively weak join between the casemate roofs and the end walls, and it was this part of the casemates which was particularly likely to leak.

Colonel Jones, the engineer responsible for the introduction of dwelling casemates into the Citadel design, did not anticipate that leakage would be a serious problem; indeed, he proposed to cover the dos d'anes with only a layer of tiling laid in cement.[13] After some practical experience with the work, he substituted duchess slates for tiles,[14] and this arrangement remained unaltered until after his departure from Halifax.

Colonel Calder, on taking over the command, decided that the slate and cement covering was inadequate for the demands of the climate, and requested that he be allowed to substitute granite flagging for the slates.[15] London equivocated, but in the end, flagging replaced both slates and tiles on most of the casemates.

By 1848 Calder had come to the conclusion that flagging alone was not enough. He was beginning to encounter serious leakage problems, most of which involved dampness on the end walls of the casemates. To solve this, he experimented with hipping the dos d'anes and flagging and counterflagging the hip. In February 1848, he wrote to the Inspector General of Fortifications to inform him of the extent of the problem, and of the means he had adopted to combat it.[16]

The question of waterproofing then became the subject of a transatlantic controversy. London's response was to provide information on expedients adopted to meet similar situations in other stations (notably Plymouth and Kingston) and to press for radical alterations involving the use of asphalt.[17] Calder, in the meantime, went on experimenting with solutions of his own devising, a process which his successor, Colonel Savage (who arrived in June 1848), continued.

In the course of 1848, Calder and Savage came to realize that correcting the weak joins at either end of the arches and dos d'anes would not by itself be sufficient to solve the problem. Something had to be done about the drainage. The solution decided upon was the provision of an internal down pipe running from the mid-point of the dos d'ane gutter through the arch and down inside the casemate beneath. (It is not clear who was most responsible for the changes – probably it was Savage.) The warmth of the casemate would, they hoped, keep the pipes from freezing in cold weather.[18]

In November 1848, Savage had Lieutenant Burmester, RE, inspect the casemates and produce a report. This document is especially interesting for the light it throws on the staunching expedients tried up to that time.[19] It reveals that no fewer than five different methods of casemate covering were then in use. Of the 54 casemates (the re-entering angle casemates and the privies were not included), 12 had been flagged and hipped, 30 had been flagged, two still retained their tile covering, four were covered in a combination of tiles and dry flagging, and six were flagged, hipped and piped.[20] In his report, Burmester did not recommend the introduction of internal piping. He thought it an unnecessary extravagance. Savage disagreed, but to keep the expense down, he proposed the re-location of the down pipe from the centre of the pier wall to the corner formed by the pier and retaining walls.[21]

Without waiting for London to react to his proposals, Savage framed an estimate for staunching the casemates and sent it off in April 1849.[22] This was the most elaborate of all the general estimates ever drawn up in the course of the construction of the Citadel. It represented a culmination of Savage's (and Calder's) experimentation with the types of waterproofing needed to withstand Halifax's formidable climate. It estimated for an extension of the hipping, flagging and counterflagging to all the casemates (privies and re-entering angle casemates again excepted), the provision of internal down pipes, the construction of a system of drains and water tanks, the alteration of the top of the rampart retaining wall to alleviate some of the water problems, and a number of lesser changes.[23] The estimate was unique in that it also proposed similar alterations to the terreplein of the cavalier.

Unfortunately few of the provisions of this very detailed estimate were ever carried out. The Fortifications department had its own ideas about the best means of staunching leakage. In the end, a system involving the extensive use of asphalt and asphalted brick was adopted. It is unfortunate that we know little about the nature of the change. The estimates for the service were included in the Ordnance annual estimates beginning in 1851–52, and, since the texts of these documents have not been located, we can only speak in very general terms of the changes made. The major component in the new solution was "Claridge's Patent Seyssel Asphalte."[24] The other materials were brick, concrete and course shingle. The dos d'anes were altered so that the hip extended to the centre of the casemate and the down pipe was moved back to the centre of the pier wall. The top of the retaining wall and escarp and the chimney casing were also altered, and extensive use was made of asphalted brick.[25] In February 1854, Colonel Savage reported on the measures adopted[26] and was relatively sanguine about their success.

Ten months later, Savage's successor, Colonel Stotherd, had the casemates inspected.[27] The results were depressing. Despite all the care and attention lavished on them in the preceding six years, 21 of the rampart casemates and all of the cavalier casemates still leaked. This revelation provoked something of a minor crisis. It is impossible to determine the exact nature of Stotherd's response to the problem, but he seems to have confined himself to repairing the asphalt and repointing the masonry. This seems to have worked. A second inspection report, made in the summer of 1856, describes a substantial improvement.[28] And with that, the long history of the casemate staunching appears to have come to an end.

Subsequent Events

There was a good deal of routine maintenance done, however, and items for such work appear in almost all of the annual estimates. Unfortunately few of these documents have survived. In some instances, we have the abstract of an estimate, but not the detailed calculation of materials and labour. It is therefore impossible to tell to what extent the casemates were altered in the course of ordinary repairs.

As an example, in 1862 the Barrack Annual Estimate included the following Citadel items:

Citadel. Sheet the ceiling of all the rooms £70
Citadel. Cavalier Casemates. Renew the floor boarding £1,466
Citadel. Nº 18 Casemate [standard system No. 25] *– Convert into a Woman's Wash House £111*
Citadel. Ablution Room Nº 23 Casemate. [Standard system No. 30]. *Provide 5 baths £64.*
Citadel. Provide 1 Steel Oven and 15 Boilers £249
Officers' Quarters. External Pointing. £11
Officers' Quarters. Preparatory Repairs. £9
Soldiers' Quarters. External pointing £94
Dº Dº Preparatory Repairs £28
Dº Dº Internal Whitewashing £222[29]

It would be interesting to know if, for example, the cavalier floor was much altered in the process of being renewed, but the lack of detail in the abstract makes it nearly impossible to find out. We can, therefore, only conclude that the casemates were subject to continual repair and renewal work and may have been substantially altered from their original form.

We do possess detailed estimates for three such alterations. In 1856, a supplementary estimate for the construction of cess pits and drains and the alteration of the soldiers' privies was submitted and approved.[30] This is especially important, since we have no other documentation for the privies.

The other two alterations for which we possess estimates both reflect the continuing preoccupation with waterproofing. In 1859 an item was inserted in the Fortifications annual estimate for 1860–61 for the construction of a subterranean area between the pier of the southernmost casemate in the curtain and the adjoining ramp.[31] In 1861 two items were inserted in the Civil Buildings Estimate for 1862–63 for waterproofing and ventilating the magazine shifting rooms and for renewing the floor of the south magazine shifting room.[32] It is not certain whether either of these proposals was carried out. They probably were.

Appendix F: Drainage

The whole question of drainage and water supply is one of the most vexing of all the problems connected with writing about the construction of the Citadel. The problems involved are twofold. In the first place, there is a great deal of ambiguity in the documents concerning the water system which survive from the period prior to 1850. In the second place, we have no documentation at all for the critical period of 1851–54 in which the final system of pipes, tanks and drains was installed.

There seem to have been three different drainage systems. One was to keep the ditch dry, one was a sewage system, and one was a complicated system of pipes and tanks designed to collect and store surface water for the consumption of the garrison. In addition, there were two wells in the Citadel and provision was at one point made for the construction of a third. The wells, however, appear to have been entirely inadequate for the purpose of supplying drinking water[1] and were of only marginal importance.

Colonel Nicolls, in his usual fashion, simply did not mention drainage at all. It was not until Colonel Jones drew up his revised estimate that the question of drainage and water supply was even raised. In the revised estimate, there are two provisions for drainage. Item 1 contains the specification for a main drain, and item 16 the specification for a surface drain for the ramparts.[2] It is not clear where the main drain was to be placed, but presumably it was for sewage, and, as the estimate calls for 761 feet of it, it may well have connected with the city sewers. The surface drain was provided "for the interior [of the fort] and . . . for the Rampart."[3] There is no indication where the surface drain for the interior of the fort was to go, but the rampart portion of it was designed for the rear of the retaining wall. The drains were to be constructed of "Pebbles laid on edge" and the water from the ramparts was apparently to run to waste in the parade square: "656 Sup^{l}. feet of 2 inch pine Plank in shoots [*sic*] for [blank in ms.] down behind the ramparts."

Nothing further was done about the problem until the mid-1840s. The main drain was probably built sometime in the early 1840s, but there was no progress made in the matter of surface drainage. When Colonel Calder drew up his supplementary estimate in 1846, he felt compelled to add a number of provisions for securing an adequate water supply. He proposed a system of drains to collect the surface water from the ramparts and store it in a tank which he proposed to build under one of the two casemates in the south side of the redan.[4] He also proposed to construct an underground communication from the counterscarp gallery opposite the northeast salient to a well on the glacis. In addition, he estimated for the provision of hopper heads, stock pipes and gutters for "all the gargoyles and buildings with open roofs"[5] to connect with the surface gutters in the parade square. These were not, apparently, provided to supply additional water to the tanks, but only to keep the water off the masonry of the buildings.[6]

Before any of Calder's suggestions could be carried out, the whole problem of casemate staunching arose. As water was the principal trouble, the question of drainage and water supply became inextricably tied to the staunching operations. In the process of finding a solution to the waterproofing problems, most of the earlier plans for drainage were altered beyond recognition or abandoned altogether. The well on the glacis and the passage leading to it were never constructed. The principle of water tanks was accepted, but the ones finally built were not placed under the casemate as planned. The surface gutters in the parade square were apparently abandoned. All these changes were relatively minor; the major problem was to dispose of the water from the ramparts and gargoyles. It rapidly became evident that the earlier expedients would not work.

The rampart surface drains proposed in the 1836 estimate (and never constructed) were intended only for the northeast salient and the redan. The pebble construction proposed was badly suited to the climate, and by 1848 it had become obvious that nothing short of granite gutters running along the entire circumference of the rampart retaining wall would suffice. Provision for the gutters was made in the staunching estimate of April 1849.[7] The provision of the tank under the casemate in the south side of the redan was retained, but only a portion of the surface water (that from the northeast salient and the redan) was routed into it. The remainder was "permitted to run to waste in underground drains," but, as the estimate's preamble noted,

should it hereafter be found desirable to save it [the water] *for consumption by the Troops, it can be collected with facility from the vertical pipes (herein provided) by means of conduit pipes connected thereto & leading to a tank in either of the casemates 13, 14, 15 or 16* [those in the north end of the curtain] *or in any other situation that may be considered more desireable.*[8]

At the same time, provision was made for providing a more sophisticated system for draining the dos d'anes. The old system of draining off the water from the gargoyles into the surface drains in the parade had one obvious disadvantage: the whole system froze solid in winter. The 1849 estimate proposed the substitution of an interior down pipe in each of the casemates and a system of underground drains beneath the parade square to carry off the water.[9] It is not clear whether the water so collected was intended to be drained into a tank or whether it was to be allowed to go to waste, although the latter is more probable.

The provisions of the 1849 estimate were never carried out. The method of staunching was much altered, and with it the water system. Unfortunately we know almost nothing about the installation of the system finally adopted. We do, however, have some idea what it looked like. The total lack of documentary evidence means that the system described below is based, to a certain degree, on speculation, but it is, I think, fairly accurate.

The water tanks under the casemate in the south side of the redan were never installed. Instead Colonel Savage proposed around 1850 to construct three rainwater tanks and filters under the parade square. The two main tanks, each holding 66,000 gallons, were located in the northeast and southeast salients, while the third, a reserve tank for 30,000 gallons, was located behind the redan. The abandonment of the original proposal for tanks meant that some of the provisions for piping the water had to be drastically altered. The most obvious casualty was Colonel Calder's drain pipe for surface water running beneath the ramparts in the northeast salient and the redan. As this was no longer needed, it was dispensed with altogether.[10]

The water for the tanks was provided by the surface gutters behind the rampart retaining wall which were, in the end, constructed more or less according to the 1849 estimate. The water was collected by a series of pipes and deposited in one or another of the main tanks. The reserve tank was intended only for the overflow from either of the other two.[11]

Apparently only the water from the surface gutters was to be collected in the tanks. The water from the down pipes in the casemates was carried off through yet another system of underground drains into the main drain. Why this rather elaborate system of drainage was considered necessary, and, indeed, why the water drained from the dos d'anes was considered less palatable than the surface water, is something of a mystery. Nonetheless, the available plans seem to indicate that the system was installed as described above. I say "seem to indicate" because the earliest plan we possess which details all the Citadel drains dates from 1891, by which time the addition of new buildings and the Citadel's inclusion in the Halifax city water system (in 1868) had altered the situation somewhat.[12]

The tanks were in use by 1855, but, much to the horror of all concerned, they did not at first provide a supply of potable water. The 1856 committee examining the state of the Citadel, commenting on the water supply, is eloquent for what it does not say:

10. On the 26th Oct^r 1855, after the Citadel had been in the course of construction for 27 years, only one tank was reported as having water in it. –

A Medical Board inspecting it declared it neither fit for culinary or internal purposes. –

What state is it in now, and what supply of water is in the remaining tanks?

10. The water in the North tank is reported by a medical Board held on 1st April 1856 as being clear, of good quality and fit for all purposes. –

The water contained in the south tank is impregnated with lime and unfit for drinking or culinary purposes. –

That the water contained in the reserve tank is muddy and contaminated with lime and other impurities rendering it also unfit for use. –

The north tank is now 8/9ths full; the other two are quite full.[13]

The entire water system had an active life of less than 12 years. As has been mentioned, the Citadel was connected to the Halifax city water supply and the Citadel system passed into disuse. The water tanks were kept up, but the other components of the system were quickly forgotten. By 1869 the wells were quite literally lost; on 1 September, the CRE wrote to the Assistant Quartermaster General announcing that "In the Citadel two wells have been discovered since the report of 30th April last was forwarded."[14]

None of the above has much bearing on the system of drainage adopted for the ditch. Colonel Nicolls constructed drains for the ditch almost as soon as he had begun to dig it. These drains ran down into the glacis from the salient angles,[15] but it is by no means certain where they emptied. The only documentary evidence is a plan for a drain for the privies which is shown connecting with a drain at the salient of the west ravelin and running down to cess pits dug in the lower part of the glacis slope.[16]

An item was included in the Ordnance annual estimate for 1859–60 for providing a cunette for the ditch. The plan accompanying this item shows that there were cess pits leading to existing drains at six points in the circumference of the ditch (at the redan salient, the northeast salient, the northwest salient, the west ravelin salient, the southwest salient and the southeast salient). The drains from the cess pits led "out of the Ditch through the Glacis."[17]

Appendix G: Walls

The Escarps

Of all the individual features of the Citadel, the escarp walls caused the most grief. Designed to inadequate specifications, they were, from the first, likely to collapse. They were redesigned several times and were not entirely completed until the mid-1840s. Even then, substantial portions of the escarp wall were of dubious quality, and remained problematical right down to the completion of the work and beyond.

The origin of the problem is discussed more fully in the main part of this report. It should suffice to say that Colonel Nicolls proposed escarps of a thin profile in order to save money. His proposals were approved, and the first call for tenders for the construction of the escarps was issued on 12 November 1828.[1] The escarp to be built by contract included the two faces of both the western demi-bastions and the flank of the southwest demi-bastion. The walls were duly constructed in the summer and fall of 1829, and Nicolls pronounced himself satisfied with the work. Late in the fall of the same year, he called for tenders for another large portion of the escarp.[2] The work this time was on the northern and southern fronts and was virtually completed by the onset of the winter of 1830–31. Nicolls again issued specifications for another stretch of wall, and this time, having expressed his complete satisfaction with the work done by the two contractors during the preceding summer, allowed the contracts to be given without tenders to the same gentlemen.[3] In all, the three sets of contracts called for the construction of 2,120 feet of wall; and, had all gone well, almost all the escarp walls of the body of the Citadel would have been complete by the fall of 1831. Things did not, however, go well. On 9 December 1830, 51 feet of the escarp in the southwest demi-bastion collapsed.[4] A few weeks later, another 70 feet of escarp (this time in the northwest demi-bastion) also collapsed.[5] The consequences of these two events were extremely serious; they led to a questioning of the entire original design, and, ultimately, to many of the problems which delayed the completion of the Citadel for almost 15 years.

The difficulties encountered in building the escarps did not by themselves cripple the progress of the work. A second factor was involved. In September 1831, Nicolls proposed the substitution of a redan for a curtain and ravelin on the eastern front.[6] Even as he made the suggestion, the last of the escarp on the north, south and west fronts was being completed. By the fall of 1831, the escarp was complete to the end of what would have been the east face of the eastern demi-bastion (in the original plan) which was now the eastern face of the salients. As long as there was uncertainty about the future of the eastern front, no more escarp could be built.

Two very different kinds of escarp were built in the summer of 1831. The last set of contracts was honoured and, for the last time, civilian masons laboured on the escarp walls. They built the curtain and parts of the salients (as they were to become). The escarp built in these areas, though somewhat more substantial than the work which had collapsed, was still very like it.[7] But the escarp design for the rebuilding of the breach in the northwest demi-bastion was entirely different. The replacement wall was designed and constructed by the Engineer department, and was a full three feet thicker at the base than the original wall had been. In addition, the new wall was buttressed up to its full height; the old buttresses had stopped at the top of the batter.

The rebuilding of the failed right face of the northwest demi-bastion in the summer of 1831 led to a ridiculous situation, wherein part of the wall was almost immeasurably stronger than the adjacent sections – a fact which made it obvious that some major rebuilding was necessary. There was, however, neither money nor authority for rebuilding, and the entire matter waited for the approval of a revised estimate for the completion of the work. This was not forthcoming until 1838. In the meantime, only the breach in the northwest demi-bastion was rebuilt.

The provisions of Colonel Jones's revised estimate (1836) finally settled the issue. The estimate definitely established the shape of the fort (the proposal for a redan was accepted) and estimated for the necessary repairs and renewals in the western bastions. The work in the western bastions was calculated to involve the following:

Right face N.W. Bastion —	*62 feet*
Left – d° —"– —d° —	*60 –"–*
Flank in d° –"– –d°–	*434 –"–*
Right face S.W. Bastion —	*200 –"–*
Left d° –"– –d°—	*63 –"–*
Flank – d°—"—d°—	*35–"–*[8]

The estimate also provided for escarps to close up the eastern front. In all, Jones estimated for the construction or reconstruction of all of the redan, about 45 feet of the eastern faces of both the eastern salients at the redan ends, virtually all of the southwest demi-bastion (except for part of the flank) and about a third of the northwest demi-bastion. About another third of the northwest demi-bastion had already been rebuilt. With the execution of the provisions of Colonel Jones's estimate, therefore, only a comparatively small portion of the escarp built before 1832 was left standing. This included the whole of the west curtain, about an eighth of the flank of the southwest demi-bastion, the south front escarp between the casemates of defence in the southwest demi-bastion and the salient, the corresponding stretch on the northern front, and the eastern faces of the eastern salients from the salient to within about 45 feet of the redan.

Three sorts of escarp wall were proposed in the revised estimate. The type intended for the rebuilt sections was a modified version of the escarp used in the rebuilding of the breach in the northwest bastion. The escarp proposed for the redan was designed especially for a casemated rampart, and was therefore somewhat thinner than that proposed for the western bastions, which were to be uncasemated. At the salient of the redan, there was a short stretch of escarp (220 feet) which had no casemates behind it. Since this was also the highest escarp wall in the fortress, it required greater strength than the rest of the redan escarp and was designed accordingly.

The new escarp walls were completed by 1843. In that year, however, Colonel Calder decided that the old escarp in the northeast salient was no longer adequate, "the Climate having . . . so acted on the Masonry as to render it doubtful whether it will sustain the weight & pressure of the ramparts."[9] Part of the rampart in question had already been casemated, and Calder proposed to casemate the rest. He proposed to tear down the old escarp to its foundation (which would, he thought, be adequate to bear the weight of the new wall) and erect on it an escarp similar to that in the redan. Like the redan, two escarp sections were designed – a relatively thin one for the casemated sections and a thicker one for the salient and easternmost part of the right face of the northwest demi-bastion, which would have to bear the full weight of the rampart.[10]

All of the Citadel escarps were completed in their final form by the end of 1847, and were little modified thereafter. The top of the escarp and its coping were altered in the casemated portions of the rampart to assist in the drainage and staunching operations, but this had no visible effect on the shape of the wall.

The implementation of the provisions of the 1843 estimate left only small portions of pre-1832 masonry escarp standing, and these were left alone until the early 1850s. By then, most of the old masonry had begun to look exceedingly decrepit. Some of the junior engineer officers began to wonder whether it would not be necessary ultimately to rebuild, but, in the end, the old walls survived, and the only work undertaken on them was in repointing them.[11]

Even as the walls were being repointed, they attracted the attention of Major General Le Marchant, who, in drawing up the questions put to the 1856 committee investigating the state of the Citadel, put particular emphasis on the state of the masonry. There were no fewer than 20 questions on the subject, ranging from general queries to specific and pointed enquiries about the type of stone used and the wording of the contracts under which (as Le Marchant thought, erroneously) most of the old work had been done. In the end, the committee delivered itself of the opinion that the walls, though hardly all that they should be, could, with care, be expected not to fall down "for many years."[12]

The Counterscarp

Work on the counterscarp was begun in 1829 and was not completed until 1848. Unlike some of the other elements in the Citadel the long delay was not the result of faulty original design. The main reason was that the counterscarp, being one of the less important features in the fortress, was allowed to languish while the more essential elements were completed. Nonetheless, the design changes in the mid-1830s did result in a radical alteration in the shape of the counterscarp gallery, and the construction of it and the counterscarp was not without incident.

The counterscarp, gallery and mines served three separate functions. The counterscarp covered the escarp from distant cannon fire; the gallery provided flanking fire for the ditch and access to the mines; the mines were intended as a defence against sapping operations by a besieging army. The gallery also provided additional structural strength for the counterscarp. In the original design of the Citadel, the counterscarp was provided with a uniform, continuous-arch gallery running the entire circumference of the fortress. At regular intervals on all four fronts, countermines branched off the main gallery. At eight points the gallery widened, at each of the four demi-bastion salients and at each of the re-entrants on the east and west fronts. The four stretches of enlarged gallery at the re-entrants were opposite the sally ports, and it is possible that they were intended as a sort of entrance hall to the rest of the gallery. Unfortunately, none of the surviving plans shows any access doors leading to the gallery at any of the re-entrants, so that there is no way of proving this hypothesis.[13] The four stretches of enlarged gallery at the salients were the so-called casemates of reverse fire. They were intended to provide concentrated flanking fire for the ditch, and were particularly important on the north and south fronts, where there was no other source of flanking fire.[14]

By the time of the wall failures and the subsequent crises of the early 1830s, about two-thirds of the counterscarp and gallery on the west front and about three-quarters of that on the north front were either completed or under construction.[15] Indeed, when Colonel Boteler took over, the counterscarp was one of the few parts of the fortress which he felt he could proceed with without altering the original design.[16] He soon found that he was wrong. The ditch opposite the left face of the northwest demi-bastion deepened between the flank and the salient. This, in turn, meant that the loopholes would be 6 ft. 3 in. above the floor of the ditch at the west ravelin end of the counterscarp and 9 ft. 3 in. above it at the salient. Colonel Nicolls's plans were, as usual, ambiguous about his intentions for this particular stretch of gallery, and Boteler was forced to write London to request an opinion.[17] The correspondence on the subject dragged on for months – also, as usual. At one point, Boteler dispatched a plan of the gallery as designed by Nicolls, showing the alternative arrangements.[18] At another point, Sir Alexander Bryce, the Inspector General, sent a plan showing his proposed alterations in the manner of construction.[19] The Inspector General's plan is interesting, since it provides a clue for the changes which were ultimately made in the shape of the gallery. General Bryce feared that those defending the gallery in case of attack would be vulnerable to grenades thrown by attackers in the ditch, and this, presumably, was the reason for the suggestion for a segmental or compartmentalized gallery contained in his plan. The proposal still envisaged a continuous arch, but it also envisaged dividing the gallery into sections, each one containing three loopholes. This proposal was not adopted, but it did provide the germ for the major alterations proposed for the gallery a few months later.

The casemate of reverse fire opposite the northwest demi-bastion continued to give trouble throughout the summer of 1832. The engineers soon discovered that the casemate was being constructed on "made ground" – that is, ground which had been built up with earth from elsewhere. This meant that the footings had to be sunk to relatively great depths in order to be secure.[20] As the counterscarp neared the salient, the problem got progressively worse. From a standard 6 ft. 6 in. footing, the depth was increased to 9 ft. 9 in., to 11 ft. 9 in., and finally to a full 14 ft.[21] This added considerably to the expense, and seems to have absorbed most of the funds allotted for that particular stretch of gallery. It is not entirely certain, but it seems likely that, when the footings were completed, work on the counterscarp and gallery stopped and was not begun again for another six years.

In the meantime, the whole question of the shape of the fort was being thrashed out. In the winter of 1832–33 no fewer than seven different estimates for the completion of the Citadel were drawn up. All seven of them, in one way or another, were based on the assumption that economies had to be made, and one feature of the fortress which could be built relatively cheaply was the counterscarp gallery.

The various proposals put forward in the winter of 1832–33 mostly involved the elimination of elements of the original plan. In one of Boteler's estimates, a proposal was put forward to build the gallery and mines as planned on the west and north fronts and omit them entirely on the other two.[22] Boteler was, however, not very happy with this arrangement, and drew up a second estimate with the intention of showing the cost of (among other things) the entire gallery and mines as originally planned.[23]

Captain Peake's ideas were more radical. He wanted to leave out not only the gallery and mines, but also the counterscarp itself on the eastern front.[24] This was a little extreme for anyone, and, in the end, a compromise was reached. In Colonel Jones's estimate, drawn up in the winter of 1833–34, the gallery was reinstated along the entire circumference of the fort, and only the countermines intended for the south and east fronts were deleted.[25] This proposal was accepted.

In the course of sorting out the extent of gallery required, the whole basic design was altered. The person most responsible for the changes seems to have been Captain Peake. His design for the gallery consisted of a series of linked arched cells with both counterscarp and rear wall of the gallery sharing a common footing.[26] The design was adopted by Jones, who altered it somewhat by redesigning the dos d'anes and doors; in this modified form, the design was accepted.[27] The reasons for the change are not easy to determine. One supposes that at least a part of the reason for Peake's design was its resemblance to General Bryce's suggestion. In addition to this, the new design was believed to be cheaper to build than the original.

After the revised version of Jones's estimate was approved in 1838, work was resumed on the counterscarp and gallery and continued for another ten years. Most, but not all, of the gallery constructed after 1838 was built to the new design. A few portions were built to the original specifications. The casemates of reverse fire were abandoned altogether, and the segmental design was used at the salients, with the addition of more loopholes.

The troublesome casemate of reverse fire at the northwest demibastion salient may well have been built as a hybrid. The footings, as we have seen, had been constructed in 1832 before the design for the gallery was changed. The gallery itself, however, was built to the new segmental pattern. Since the new pattern was designed with a different type of footing, one can only conclude that the gallery at the salient deviated somewhat from the standard plan. Either that, or the counterscarp has, at that point, the phenomenal footing of 14 ft. by 12 ft.

The Rampart Retaining Wall

The first design for the rampart retaining wall was the work of Colonel Nicolls. As far as I have been able to determine, none of the retaining wall was ever built to Nicolls's specifications, but it seems likely that his design would have been as inadequate for the retaining wall as the escarp designs were for the escarps. When Boteler and Peake drew up their revised estimates in 1832–33, the retaining walls they proposed were substantially thicker than Nicolls's.[28]

It was Captain Peake who suggested the final design of the retaining wall for the uncasemated part of the rampart. The retaining wall was subject to the same stresses as the escarp, and there was some difficulty in designing a wall which could bear the weight of the ramparts without being excessively expensive. Peake's solution was to provide the wall with arched recesses for greater strength. This allowed the wall to have a thin profile (between 2-1/2 and 3 ft.). The similarity between the retaining wall designed in this manner and the segmental pattern counterscarp gallery (also Peake's design) is striking; indeed, it seems likely that the one suggested the other.[29]

Colonel Jones, in drawing up the version of the revised estimate which was finally accepted, borrowed Peake's design. Virtually all the documentary material we possess on the subject of the retaining wall is contained in Jones's estimate. He provided for an arched retaining wall for the west and south fronts and for parts of the east and north fronts.[30] The remaining sections of the retaining wall were included in the estimate for casemates. The retaining wall for the redan, for example, was built as an integral part of the redan casemates.[31]

When additional casemating was proposed in 1843, no mention of the retaining wall was made in the estimate.[32] This leads to the supposition that the existing retaining wall was adapted to meet the needs of a casemated rampart. At the same time that the additional casemating was decided upon, it was found necessary to rebuild the retaining wall in front of some of the casemates at the north and south ends of the curtain, and the plans and estimates for this service are the best we possess for the type of retaining wall in use for casemated ramparts.[33]

The retaining wall was altered somewhat in the course of the staunching operations.[34] After this, no additional work was done on them until the committee examining the state of the Citadel investigated them in 1856, and reported that the walls in the southeast salient were slightly defective.[35] It was not until 1875, however, that the engineers felt it necessary to make any major repairs. In that year, a proposal was submitted for the reconstruction of the retaining wall in the southeast salient. The plan drawn up to accompany the proposal is the only one available which gives accurate information about the dimensions of the retaining wall and recesses as they were actually built.[36] The plan also shows something of the variety of uses to which the recesses were put.

The major provision of the rebuilding scheme was the addition of buttresses between every second recess. With the acceptance of the proposal and the construction of the buttresses, the retaining wall reached its final form.

Appendix H: The Gate and Bridge

The gates, entrance tunnel and bridge were all provided in item 3 of the 1836 revised estimate.[1] The entrance tunnel was constructed at the same time as the redan casemates in the late 1830s, but the bridge was not built until 1850. It is not known when the gates were constructed.

In addition to the description of the bridge as proposed, we also possess a set of plans for both the standing and drawn portions of the bridge as finally constructed.[2] These are entirely reliable for information on the method of construction employed, and in any differences between the written description in the estimate and the plans, the former should be disregarded. The estimate does, however, give some idea of the type of timber used.

The plan and sections drawn to illustrate the proposal for installing a water tank under the casemate in the south side of the redan[3] also give some information on the south wall of the gate tunnel and the doors leading to the guardroom.

Appendix I: The Sally Ports

In the original plan of the Citadel, seven sally ports were envisaged, including three in the west curtain (one leading to the caponier), one in the north front re-entrant, one in the south front re-entrant, and two in the east curtain. Of these, three were abandoned (the one leading to the caponier and the two in the east curtain) and two were added, at the redan ends of the east faces of the eastern salients, for a final total of six sally ports.

Of these six, the two in the west curtain were built to Colonel Nicolls's original design; since the surviving documents for much of the building during the early period are sketchy, we know little about them. A plan and sections drawn to illustrate alterations in the privy drainage in 1856 has two sections of the south sally port.[1]

The four remaining sally ports were provided in the 1836 estimate: the east ones in item 3 and the re-entrant ones in item 4.[2] In 1857, an item providing for the construction of doors for the ditch ends of the sally ports was inserted in the Ordnance annual estimate. Because of an administrative error made in London, funds were authorized for only one of the six doors, and the item had to be included again in the following year's estimate.[3]

Appendix J: Ravelins

In the original plan of the Citadel, four ravelins were provided for, one on each front. The north and south ravelins were identical, and each had a single-storey casemated guardhouse in the centre of the gorge. The west ravelin was approached by a caponier leading from a sally port in the west curtain. It was a two-storey affair, with the caponier connecting with the lower storey and the upper storey providing access to the terreplein of the ravelin. The east ravelin contained the entrance gate and differed from all the others. It also had a guardhouse, but one which was a single-storey, asymmetrical structure, set beside the parapet on the left side of the gorge. The north, south and west ravelin guardhouses were provided with ditches separating them from the terreplein of their ravelins, but the surviving plans are contradictory about the ditches' extent and function.[1]

In the course of the building of the Citadel, this basic outline was much altered. Like everything else, the ravelins were the subject of controversy in the discussion of the future of the Citadel which continued through the 1830s. In the end, three out of the four were built, but only after almost every major feature of the original design had in some way been changed.

The west ravelin was begun in the summer of 1829 and the work was more or less complete by the end of the following summer. In 1831 the north ravelin was begun. By then, Nicolls had altered the line of the north front trace to include the well on the north side of the northeast salient. This resulted in an alteration to the position of the re-entrant and was responsible for the off-centre re-entrant in the gorge of the ravelin which is still its most notable characteristic.[2] By the end of the summer of 1831, the escarp wall of the north ravelin had been carried up to a height of 20 feet, and the prospects for completing the work in another season were excellent. In fact, the ravelin was destined not to be finished for another eight years.

The problem with the ravelins, as with so much else, was the inadequacy of Colonel Nicolls's original design. The west ravelin had been built with the thinnest escarp wall in the entire Citadel.[3] The north ravelin, which was not begun until the escarps in the western bastions had collapsed, was, as a result, provided with rather thicker escarps,[4] but even these were of uncertain durability. The uncertainty was amplified by the proposal to construct a redan on the eastern front, which, of course, would render the eastern ravelin superfluous. The result of all this confusion was that all work on the ravelins stopped in the fall of 1831.

In the winter of 1831–32, Colonel Boteler inspected the work at the Citadel. The west ravelin was already in a sorry state:

> *I do not think the gorge (only four feet thick) especially at the south end would bear to be carried up to the full height – the escarp also on the left face of this ravelin towards the salient angle is slightly bulged.*[5]

For the moment, however, the problem was not the condition of the west ravelin but the ultimate disposition of the other three. Captain Peake, for example, wanted to do away with the south one, and all the engineers concerned with the problem wanted to replace the east one with a redan. In the end, the north, south and west ravelins were retained and the east ravelin was abandoned.[6]

The final version of the revised estimate for the completion of the Citadel (1836) contained three provisions relating to the ravelins. Colonel Jones, who drew up the estimate, decided that, in spite of its obvious deficiencies, the west ravelin could be expected to stand, and provided only for the rebuilding of the gorge wall.[7] Provision was also made for completing the north ravelin – the escarp already built up to 20 feet was left standing – and for building the south ravelin from scratch. This last item gave Jones a certain latitude in matters of design. He provided the south ravelin with a thicker escarp than either of the others and allowed for its construction in rough granite ashlar facing.[8]

It was at this time that the final form of the guardhouses was settled. The old one-storey designs were discarded and two-storey guardhouses, similar to the one already built in the west ravelin, were substituted. Unfortunately, the two items for ravelins in the 1836 estimate are remarkable only for their brevity, and we know little about Colonel Jones's design for the guardhouses.

By the early 1840s, the three ravelins were complete. Nothing more was done to them until 1843, when London authorized the renewal of the roofs of the north and south guardhouses. The old arrangement of slates laid in cement had been found wanting, "the severe frosts removing a considerable portion of them each winter,"[9] and a system of tiles set with boards and rafters was substituted.[10]

By 1846, however, the west ravelin was clearly *in extremis.* In the supplementary estimate drawn up in March, Colonel Calder provided for the reconstruction of the entire ravelin.

> *In the Revised Estimate of 1836 provision was made for taking down and re-building the gorge of this work, the remaining part being "expected to stand." Since that estimate was prepared the gorge has fallen down carrying with it part of the guardhouse, and the faces* [*have*] *. . . cracked from the foundations upwards in several places.*[11]

Calder proposed to rebuild the ravelin along the lines of the north and south ravelins.[12]

The Inspector General offered a few suggestions for the improvement of the rebuilding scheme:

> *The necessity for rebuilding this part of the work is made more apparent in the Report of the Estimate and is entirely discreditable to the execution of the Engineer Department under whom it was built within the last 20 years. It would be better if the form of the guardhouse were revised so as to throw its fire more into the Ravelin and that it be separated by a ditch if possible with a view of its being more effectually a Redoubt and it would then be a more wholesome building.*[13]

The Inspector General's criticism is interesting for the light it casts on the structure of the north and south guardhouses as constructed. As we have seen, they were originally designed with their own ditches, and it would seem from the above that the ditch was omitted from the 1836 design.

Colonel Calder replied on 21 July:

> *The form of the Guardhouse is that of the old one as well as that of those in the North and South Ravelins rebuilt*[14] *under the authority of the Revised Estimate of 1 Feb^{y} 1836; – but in furtherance of the Inspector General's suggestion the loopholes are revised so as to throw its fire into the Ravelin. . . . Its separation by a ditch would be an improvement as a work of Defence was the interior space sufficiently large, and it would render the building more wholesome in some situations, but in this climate where a deep narrow ditch is liable to be filled with snow, which in a few hours becomes so hard as to preclude its removal excepting by subsequent thaws, it is apprehended the walls might receive more injury and the building* [be] *less fit for occupation than at present.*[15]

Despite his reservations, Calder accepted the proposal for a ditch, and included an item in the revised version of the estimate for the construction of one in all three of the ravelins.[16]

With the acceptance of the revised version of the 1846 estimate, the final form of the ravelins was decided. There remained the slight matter of rebuilding the entire west ravelin. In the spring of 1847, Calder had the old (1812) magazine blown up. In his letter reporting the demolition, he asked permission to use the same method to deal with the ravelin.[17] It was some time before he got a reply (London succeeded in losing his letter),[18] but in the end permission was refused on the grounds that the stone from the old ravelin might be used in building the new.[19] The ravelin was finally torn down by conventional means in the summer of 1848, and the new ravelin was completed by the end of the following summer.

Appendix K: Armament

There are no surviving accounts of the armament originally proposed for the Citadel. It is likely that Colonel Nicolls, in the early stages of planning, had only an approximate idea of the type and calibre of ordnance to be mounted on the new fortress. In his original estimate and his first plans, he provided for eight platforms with embrasures and four sets of curbs for traversing platforms for the body of the work, as well as four curbs for traversing platforms and 17 embrasures and platforms for the ravelins. He also noted that the roofs of the two cavaliers were intended as gun positions for fourteen 24-pounders.[1] In addition to these, each of the 16 casemates was to be provided with a gun. This gives a grand total of 63 gun positions, and may be taken as an approximate indication of the amount of armament intended.[2]

Seven years later, Colonel Boteler drew up a list of the type and calibre of gun intended for the Citadel, and appended it to his general plan of the fort.[3] This list reveals that the chief type of weapon to be mounted was the 24-pounder carronade; no fewer than 17 were intended for the fort. The heaviest gun contemplated was the 24-pounder. It is interesting to note that, in the beginning, the heavy ordnance was to be concentrated almost entirely on the cavaliers and ravelins.

The 1832 list also reveals some of the difficulties inherent in trying to foresee the armament requirements. No fewer than 18 of the proposed 69 guns were to be mounted on structures which had not yet been built and were the subject of some controversy. The list briefly noted the changes which would have to be made in the ordnance if the proposed redan was approved. But the list cannot cover all contingencies, and it is too sketchy to be really useful as a guide to the armament if the design of the fortress was altered. In fact, the entire question of ordnance was left in abeyance for almost a decade while the fundamental questions concerning the shape of the fortress were being settled. (Strangely enough, questions of armament and gunnery seem to have had little bearing on the decisions which were finally reached.) It was not until the work was substantially complete that any attempt was made to provide it with guns.

The most important document in the history of the Citadel's ordnance is the supplementary estimate of 1846. In the first version of the estimate, Calder provided for the curbs and pivots for the cavalier platform,[4] the embrasures, revetment, gun platforms and curbs for the west ravelin,[5] and specimen estimates for segmental curbs and pivots, circular curbs and pivots, and ground platforms for the remainder of the fort.[6] The specimen estimates were for one of each kind of platform. Calder could not have been more specific about the numbers of each type required, since there was no approved armament proposal.

The Inspector General commented on the specimen estimates:

Items 15, 16 & 17 will have to be provided but the first step is the joint report of the Comm^{g} Officer of Artillery and the C.R.E. approved by the Commander of the Forces of the Armament necessary.[7]

The CRE and CRA together drew up the necessary report in the early summer of 1846 and dispatched it to London on 21 July.[8] In early September, the Director General of Artillery communicated his satisfaction with the scheme,[9] and a few weeks later it was approved by the Board of Ordnance.[10]

The proposal called for 94 guns. The most common type was the 32-pounder smoothbore which formed the main armament on all fronts. The remaining types provided in the proposal were mostly for specific purposes. The 24-pounders were intended for the casemates of defence, to defend the ditch; the 8-inch guns were intended only for the salients of the body of the work, and the howitzers and mortars were apparently only to be mounted in the event of a siege.

The acceptance of the ordnance proposal set the final form for the type and variety of gun positions on the Citadel ramparts. Unfortunately the documentation for the construction of the gun positions is fragmentary and contradictory. The only two structures in the entire fort where the types of gun position and their dimensions are absolutely certain are the cavalier and the west ravelin.[11] We know from photographic evidence that the south ravelin was provided with ground platforms on its faces and a circular curb and pivot at its salient,[12] but the exact dimensions of the ground platforms remain a mystery. They might have been like those provided for the west ravelin[13] or they might have been similar to the ground platforms provided in item 17 of the 1846 estimate.[14]

The surviving documents about the armament of the north ravelin are even more scanty. We know what guns were mounted, but not the type of gun positions used. Presumably the north ravelin's positions were similar to the south ravelin's – the 32-pounders on the faces mounted on garrison carriages on stone ground platforms and the 32-pounder at the salient mounted on a traversing platform on a circular curb and pivot.

The difficulties encountered in trying to determine the nature of the gun positions in the body of the work are even greater. To begin with, we have two entirely contradictory memoranda on the subject. The first, appended to the initial version of the 1846 estimate,[15] suggests that it was Calder's intention to build eight stone ground platforms on the ramparts of the body of the fort. The second, appended to the formal armament proposal, reads as follows:

The guns on all the Salient angles and the Cavalier to be mounted on ordinary Traversing Platforms.

Those on the faces of the Redan, North, South, East and West Fronts to be mounted on block Traversing Platforms.

Those in the Flanks of the Demi-Bastions as well as all Mortars on L^{t} Co^{l} Alderson's Siege Platforms, when required to be mounted, at which time the Embrazure may be cut through the Parapet, – the Platforms to be kept in store for their preservation and the guns &c [?] to be skidded in position.

Stone Platforms and Curbs are laid in the North and South Ravelins. –

Long 32 pounder guns are proposed for the flank of the South West Demi-bastion in consequence of the length of range seen over the Counterscarp North of the West Ravelin.[16]

To complicate matters still more, there is some evidence that the acceptance of the armament proposal led Calder to change the provisions for curbs and platforms in the revised version of the 1846 estimate. Unfortunately this evidence is also contradictory. It would seem that the only copy of the revised version of the estimate available in Canadian archives is incomplete. In the abstract of this copy, item 15 (the item for segmental curbs and pivots) has been altered to show a total cost of £299 7s. 6d., the cost of five curbs. In addition, three new items have been added to the abstract:

Item 18 – 19 Curbs for Dwarf platforms at £30 . . 0 . . 0 each – £570 . . 0 . . 0.

Item 19 – 12 Wooden Ground Platforms at £12 . . 0 . . 0 each, £144 . . 0 . . 0

Item 20 – 12 D^{o} — Mortar — D^{o} — at £6 . . 0 . . 0 each, £72 . . 0 . . 0.[17]

When one turns to the text of the estimate, however, one finds no further mention of the three new items, and the items for circular curbs and pivots (items 15 and 16) and for ground platforms (item 17) are left unaltered.[18]

The last major piece of evidence is the surface plan drawn in April of 1852.[19] This purports to show all the gun positions, embrasures and traverses on the ramparts. The plan is called "record Plans from actual measurement," and there would be little reason to doubt such a statement were it not for the fact that the ramparts were still unfinished in 1852. Nevertheless, one must accept the plan as accurate, at least in essentials.

The contradictory mass of evidence described above cannot, without the discovery of fresh information, be made to yield definitive answers to questions about the Citadel's armament. It is possible to draw some conclusions, but they must be considered extremely tentative.

In the first place, there is no reason to doubt that the armament listed in the 1846 estimate was ultimately procured for the Citadel. Every bit of evidence points to this being the case. It also seems fairly certain that the guns were mounted, or were intended to be mounted (a distinction which will become important later in this discussion) in the locations indicated in the proposal. The 1852 plan, for example, shows positions and embrasures in all the locations proposed. The difficulty lies in discovering what types of carriage and platform were used to mount the guns.

The problem of the 8-inch guns at the salient is the easiest to solve. They were almost certainly mounted on garrison carriages (there is no indication of the type – wood or iron) on traversing platforms on circular curbs.[20] The 1852 plan shows circular curbs in the appropriate places, and there is no good reason to doubt its accuracy.

The question of the carriages and platforms for the rest of the 32-pounders intended for the body of the work is a little more complicated. The fundamental question is whether they were mounted on segmental curbs or on "curbs for Dwarf Platforms," which are mentioned in the partly revised version of the 1846 estimate. My own opinion is that the latter was the case. The positions shown on the 1852 plan are the wrong shape for segmental curbs,[21] but the same revision of the estimate contains an item for five of the segmental curbs, which indicates that both types may conceivably have been used.

As we have seen, Colonel Calder intended to mount the four 32-pounders in the flanks on "L^t Co^l Alderson's Siege Platforms" – or, rather, he intended to construct the platforms and keep both them and the guns in storage until they should be needed. There is, again, no reason to question this intention.

But there is some doubt whether the Alderson platforms were ever built to mount the 12 mortars provided for in the armament proposal. A photograph taken in the late 1870s clearly shows the two mortar platforms,[22] and they differ considerably from plans of both the Alderson siege gun platforms and the Alderson siege mortar platforms.[23] It would seem, therefore, either that the original Citadel mortar platforms were replaced with ones of a different pattern sometime between 1850 and 1870, or that the Alderson platforms were never constructed for the mortars. Without more evidence, one cannot be more specific than that.

Finally, there are problems concerning the ground platforms and the howitzers. None of the documents mentioned above makes any mention of carriages or platforms for the howitzers. The 1852 plan, however, shows enough gun positions to account for both the guns and howitzers intended for the body of the work. It shows, moreover, 12 positions which are clearly occupied by ground platforms. Four of these are in the flanks and were obviously for the 32-pounders which were intended for those locations. The distribution of the other eight parallels the proposed distribution of the howitzers on the various fronts. This begs two questions: What sort of ground platforms were they, and were they intended for the howitzers?

In answer to the first question, there are three alternatives: stone ground platforms as provided in the

1846 estimate;[24] wooden platforms of the Alderson pattern,[25] or wooden ground platforms of another type. The first alternative seems most unlikely. One modern writer has calculated the weight of a 32-pounder mounted on a garrison carriage on a stone platform at 65 tons. On the basis of this, he concludes that stone ground platforms were used only on the ravelins, and that the platforms for the body of the work were of wood.[26] It is difficult to disagree with this conclusion. It seems unlikely that any of the engineers responsible would have risked placing such a heavy platform on top of a work with escarps as doubtful as those in the Citadel. It seems far more probable, then, that the ground platforms were wooden.

Were they of the Alderson pattern? We know that platforms of this pattern were ordered at one point,[27] so it seems likely. On the other hand, the ground platforms shown on the 1852 plan are the wrong shape (the Alderson platforms were rectangular). This discrepancy may be the result of a draughtsman's error, for, as we shall see, it is exceedingly unlikely that wooden platforms of any description were ever actually put in position on the ramparts.

The final question is whether or not the ground platforms shown were ever intended for the howitzers. There is no definite answer to this question either, but the coincidence of numbers of howitzers and number of positions makes it likely that they were.

A final word on the 1852 plan. It shows the positions and embrasures for the 32-pounders in the flanks, despite the fact that the engineers never intended to cut embrasures or to mount the guns until it was necessary to do so. This suggests that the 1852 plan shows the intended – not the actual – position of the guns. The fact that the plan was drawn before the ramparts were completed may be taken as further support for this assumption. I would suggest, in addition, that the remaining eight ground platforms were also shown in their intended, not their actual, positions. If we accept the fact that the other positions were intended for howitzers, then it is reasonable to assume that the howitzers and ground platforms were kept in storage, and the embrasures shown on these positions were not cut. The 1856 report supports this hypothesis.[28]

None of the documentation cited above provides any information about the type of carriage intended for the 24-pounders mounted in the casemates of defence. Until more evidence comes to light, this subject will remain a mystery.

The report of the 1856 committee on the state of the Citadel[29] sheds light on some of the specific problems of the armament and ramparts. The report also contains recommendations for the reconstruction of the parapet revetments in the ravelins. The parapet of the north and south ravelins was originally revetted with brick. The committee noted that the Commanding Royal Engineer already had permission to remove the brickwork, and went on to recommend that the masonry and brickwork in the interior of the ravelins be reduced "as far as possible."[30] The brick revetments in the north and south ravelins were removed.[31] It is impossible to tell whether those in the west ravelin were likewise removed. Certainly the masonry embrasures (unique in the Citadel) were not altered.[32]

Appendix L: General Plan Bibliography

This plan bibliography lists every plan of the Halifax Citadel located by the author during his research. The plans are from five principal sources:
(1) The manuscript and microfilm collections of the Public Archives of Canada,
(2) The National Map Collection of the Public Archives of Canada,
(3) The manuscript and map collections of the Public Archives of Nova Scotia,
(4) The Public Record Office, London,
(5) The files of the Atlantic Regional Office of National Historic Parks and Sites Branch, Parks Canada.
The last two sources require some explanation. Copies of plans in the Public Record Office were sent to National Historic Parks and Sites Branch as a result of research done some years before research on this report was begun. The plans from the Atlantic Regional Office have since been turned over to the National Map Collection of the Public Archives of Canada and are so cited in this bibliography. Copies of all plans listed are on file at National Historic Parks and Sites Branch.

The bibliography is complete (at least in terms of plans available in North America) down to about 1870. After that date there are plans, in addition to those listed here, which have yet to be located and catalogued. This bibliography encompasses only a fraction of the plans of the Halifax Citadel drawn by the Royal Engineers during the period of British occupation. The majority of these plans may have been destroyed. Some of them may still exist in collections in Britain.

Code: 01-1795-5-1.
Title: "A General Plan / of the Works on Citadel Hill shewing in Yellow the relative Situation of the / New Works with respect to the Old Ones which are Coloured Red."
Signature and date: Straton, "Col. Col. / [*sic*] N.S. / Vol. / 25 p. 201 /. Enclosed in letter of 19th May 1795 / H R H Prince Edward / to / Dundas."
Scale: "'700' being the length of the exterior side A:B."
Comments: Plan of Straton's Citadel (the third) superimposed over a plan of the second Citadel. This plan shows the outlines only and contains few details.
Source: Public Archives of Canada.

Plans 01-1800-1-1 to 02-1800-1-3 (three plans).
These plans show Captain Fenwick's proposal for a work for Citadel Hill comprising a masonry keep surrounded by earthworks. The plans were never carried out.
Code: 01-1800-1-1.
Title: Not entirely included on photocopy in National Historic Parks and Sites Branch files.
Signature and date: Fenwick, 20 Jan. 1800.
Scale: 1 in. to ca. 75 ft.
Comments: Outline plan keyed for sections. The plan also shows the relationship between Fenwick's proposed scheme and Straton's third Citadel.
Source: Public Record Office, London (WO78, No. 1670, MPH489).

Code: 28-1800-1-2.
Title: "Plan, Sections & Elevation of a / work proposed to be erected on Citadel Hill, Halifax."
Signature and date: Fenwick, 20 Jan. 1800.
Scale: 1 in. to ca. 15 ft.
Comments: Plan, elevation, section and reference notes. The plan shows Fenwick's proposed towers and casemated cavalier.
Source: Public Record Office, London (WO78, No. 1670, MPH489).
Code: 02-1800-1-3.
Title: "Sections of Citadel Hill."
Signature and date: Fenwick, 20 Jan. 1800.
Scale: 1 in. to 30 ft.
Comments: Four sections. The sections are keyed to the general plan of the work (plan 01-1800-1-1).
Source: Public Record Office, London (WO78, No. 1670, MPH489).

01-1825-12-1 to 02-1825-12-8 (eight plans).
These plans contain Nicolls's original design for the Citadel. There are three series, the second of which (plans 01-1825-5-1 and 6-1) shows some variation from the other two.
Code: 01-1825-12-1.
Title: "Plan N° 1."
Signature and date: Nicolls, 20 Dec. 1825.
Scale: 1 in. to 100 ft.
Comments: Outline plan with reference notes, showing ramparts; the subterranean features are indicated by dotted lines. The plan shows the relationship between Nicolls's design and Straton's third Citadel, as

well as a large stretch of the surrounding countryside. It is keyed for sections (*see* below).
Source: Public Record Office, London (WO78, No. 1786, MR947).

Code: 02-1825-12-2.
Title: "Plan N° 2."
Signature and date: Nicolls, 20 Dec. 1825.
Scale: 1 in. to 30 ft.
Comments: Two sections, both showing Nicolls's proposal and the ruins of the third Citadel. The east-west section includes the west ravelin, the caponier, a section of the west cavalier, the gate, the bridge and the east ravelin. The north-south section includes the north ravelin, a section of the north cavalier, elevations of the west cavalier, the old (1812) magazine, and the south ravelin. The sections are keyed to plan 01-1825-12-1.
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 03-1825-12-3.
Title: "Plan N° 3."
Signature and date: Nicolls, 20 Dec. 1825.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections, elevation and reference notes. The first plan of the west cavalier. It shows, among other things, the proposed curbs and carriages for the armament.
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 03-1825-12-4.
Title: "Plan, Elevation & Section of a / Casemated Cavalier proposed / to be erected in Fort George / Citadel Hill."
Signature and date: Nicolls, 20 Dec. 1825.
Scale: 1 in. to 10 ft.
Comments: Plan, elevation and two sections. This plan is virtually identical to the preceding (plan 03-1825-12-3) and differs only in small matters of detail. It provides some detail of the layout of the chimneys.
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 01-1825-12-5.
Title: "Proposed plan for Fort George, Citadel Hill."
Signature and date: None. Noted as being transmitted by Nicolls, 20 Dec. 1825.
Scale: 1 in. to 100 ft.
Comments: Outline plan of the ramparts. This is a simplified version of plan 01-1825-12-1. It differs from the latter in some matters of detail, notably the arrangement of the ravelin guardhouses. This plan also shows evidence of alteration in London. Unidentified buildings are shown in the gorges of three of the bastions. These were apparently intended to illustrate General Bryce's proposal to relocate the cavaliers (*see* "The Bureaucratic Process").
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 02-1825-12-6.
Title: "Fort George, Citadel Hill."
Signature and date: None. Noted as having been transmitted by Nicolls, 20 Dec. 1825.
Scale: 1 in. to 30 ft.
Comments: Two sections. These are keyed to 01-1825-12-5, and the same considerations outlined in the discussion of the latter apply here. There is, however, no sign of the proposed relocation of the cavaliers in the section.
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 01-1825-12-7.
Title: "Fort George, Citadel Hill, as proposed / by Colonel Nicolls, Royal Engineers, December, 1825."
Signature and date: Nicolls, 20 Dec. 1825.
Scale:
Comments: Outline plan. This plan is nearly identical to plan 01-1825-12-1.
Source: Public Record Office, London (WO78, No. 1786, MR947).
Code: 02-1825-12-8.
Title: None.
Signature and date: Lieutenant Blakiston, RE, 20 Dec. 1825.
Scale: 1 in. to 30 ft.
Comments: Two sections, keyed to plan 01-1825-12-7.
Source: Public Record Office, London (WO78, No. 1786, MR947).

Code: 01-1828-10-1.
Title: General plan, Fort George, Citadel Hill, showing ". . . the Work in progress, and on which / the £15,000 granted by Parliament / in 1828 is supposed to be expended. / That coloured blue is included / in the Supplementary Estimate for 1829."
Signature and date: Nicolls, 7 Oct. 1828, and Nightingale (copyist), 24 Dec. 1831.

Scale: Not given.
Comments: Outline plans of ramparts and surrounding country, with reference notes. This plan shows the work proposed for the parliamentary grants of 1828–29, and also the proposal for splitting the north cavalier. In addition it shows all four bastions as being hollow.
Source: Public Archives of Canada (MG12, WO55, Vol. 865, fol. 580–1).

Code: 15-1828-10-2.
Title: None.
Signature and date: Nicolls, 7 Oct. 1828.
Scale: 1 in. to 20 ft.
Comments: Section of counterscarp, gallery and mine opposite west ravelin.
Source: Public Archives of Canada (MG12, WO44, Vol. 203, fol. 296).

Code: 14-1828-10-3.
Title: None.
Signature and date: Nicolls, 7 Oct. 1828.
Scale: 1 in. to 20 ft.
Comments: Plan and section of escarp wall. The location of the escarp is not given, but it was intended for the western bastions. It was the escarp built to this specification which collapsed in December 1830.
Source: Public Archives of Canada (MG12, WO44, Vol. 203, fol. 297).

Code: 15-1828-10-4.
Title: None.
Signature and date: Nicolls, 7 Oct. 1828.
Scale: 1 in. to 20 ft.
Comments: Section of counterscarp, gallery and mine, main ditch (presumably western front).
Source: Public Archives of Canada (MG12, WO44, Vol. 203, fol. 297).

Code: 01-1830-8-1.
Title: "Plan shewing the Common belonging / to the town of Halifax / Nova Scotia."
Signature and date: Three signatures. (1) Nicolls, 30 Aug. 1830; (2) J. Nightingale (copyist) 20 Oct. 1830; (3) C. Pettigrew (copyist, PRO) Aug. 1920.
Scale: 1 in. to 600 ft.
Comments: General plan showing surrounding country to west and south, with reference notes. This plan details property ownership in the surrounding area, and shows the relationship of the Citadel to Fort Massey and Windmill (Camp) Hill.
Source: Public Archives of Canada, National Map Collection (H4/250, from CO217, Vol. 151, fol. 109).

Code: 01-1830-9-1.
Title: "Plan shewing Fort George on the / Citadel Hill, with the common, roads &c. / as existing at present."
Signature and date: Three signatures. (1) Nicolls, 7 Sept. 1830; (2) J. Nightingale (copyist), 9 Oct. 1830; (3) copied at PRO, Sept. 1920.
Scale: 1 in. to 500 ft.
Comments: General plan showing surrounding country; reference notes. This plan is nearly identical to plan 01-1830-8-1.
Source: Public Archives of Canada, National Map Collection (H4/250, from CO217, Vol. 151, fol. 99).

Code: 13-1831-5-1.
Title: "Plan shewing the Revetment of the / North Ravelin, & Section of the same / as proposed to be built on Citadel Hill."
Signature and date: Nicolls and Wentworth, 2 May 1831.
Scale: 1 in. to 15 ft.
Comments: Plan, two sections, reference notes. The plan shows the state of the north ravelin and the adjoining escarp wall. The sections are of proposals for the west curtain, and of the north ravelin escarps.
Source: Public Archives of Canada (MG12, WO55, Vol. 868, fol. 498).

Code: 01-1831-9-1 (9-1A).
Title: "Plan of Fort George, Citadel Hill / shewing the work in Progress. – approved / and those estimated for the year 1832."
Signature and date: Nicolls, 3 Sept. 1832.
Scale: 1 in. to 100 ft.
Comments: 9-1 contains a plan, one section and reference notes. Despite its date the plan not only details construction down to 1832, but also has a section of the escarp of the southwest demi-bastion as built in 1834. The plan shows the three cavaliers which are labelled No. 1, West Cavalier, No. 2, South Cavalier, and No. 3, North Cavalier.

9-1A: This variation is the first plan showing the proposed redan. It is uncertain whether or not the proposal shown is Colonel Nicolls's work or that of his successor, Lieutenant Colonel Boteler. The plan also contains notes about the parapet, signed by Boteler in April 1832.

Source: For 9-1, Public Archives of Canada (MG12, WO55, Vol. 862, fol. 330); for 9-1A, Public Record Office, London (WO78, No. 1667, MPH486).

Code: 14-1831-13-1.
Title: Section of escarps.
Signature and date: No signature. Dated 1831.
Scale: Not given.
Comments: Three sections.
Source: Public Archives of Canada (MG12, WO55, Vol. 868, fol. 497).

Code: 14-1831-13-2.
Title: "For the West Curtain. / Fort George." "For the North Ravelin."
Signature and date: None.
Scale: Not given.
Comments: Two sections of escarp to accompany Nicolls's supplementary estimate of 2 May 1831.
Source: Public Archives of Canada (MG12, WO55, Vol. 868, fol. 496).

Code: 01-1832-2-1.
Title: "Plan of Fort George / Halifax N.S. / as supposed to be when finished agreeably / to the documents on the spot."
Signature and date: Boteler, 14 Feb. 1832.
Scale: 1 in. to 40 ft.
Comments: Plan, three sections, reference notes. The plan was dispatched by Colonel Boteler in explanation of the points covered in his letter of 14 Feb. 1832 (*see* "Truth and Consequences").
It is the best large-scale plan of the original design of the Citadel and shows all three cavaliers. The sections are, as follows:
(1) Through a casemate of reverse fire (with plan of a loophole).
(2) Through the counterscarp gallery.
(3) Through the caponier.
Appended to this plan is a memorandum drawn up by Colonel Ellicombe detailing the state of the work in November 1832. The reference notes also detail an armament proposal.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 02-1832-2-2.
Title: "N° 3 / Sections through Fort George / Halifax N.S. / as supposed to be when finished / agreeably to the documents on the spot."
Signature and date: Boteler, 14 Feb. 1832.
Scale: 1 in. to 30 ft.
Comments: Seven sections, keyed to plan 01-1832-2-1. The seven are, as follows:
(1) An east-west section through the entire fort, showing the west ravelin, the caponier, an elevation of the northwest bastion, a section of the west cavalier, a partial elevation of the north cavalier, the gate and bridge, an elevation of the northeast bastion, and the east ravelin and guardhouse.
(2) A north-south section through the entire fort, showing the south ravelin, the south sally port, an elevation of the south cavalier, an elevation of part of the retaining wall of the curtain, a section of the west cavalier, a section of the north cavalier, the north sally port and the north ravelin.
(3) A section of the right face of the northeast demi-bastion.
(4) A section through the west ravelin.
(5) A section through the left face of the southeast demi-bastion.
(6) A section through the right face of the southwest demi-bastion.
(7) A section through the left face of the northwest demi-bastion.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 03-1832-2-3.
Title: "N° 4. Fort George Halifax / Sketch of South Cavalier or Officers Quarters as inserted in the annual estimate for 1832 / to be covered with a shingle roof."
Signature and date: Boteler, 14 Feb. 1832.
Scale: 1 in. to 10 ft.
Comments: Two plans, two sections. The south cavalier was, of course, never built.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 03-1832-2-4A (2-4B)
Title: "N° 5 Fort George, Halifax / Shewing a proposed South Cavalier or officers Quarters with a central corridor / to be covered with a shingle roof."
Signature and date: Illegible signature (possibly Lieutenant Wentworth's). Dated 14 Feb. 1832.
Scale: 4A, 1 in. to 20 ft.; 4B, 1 in. to 10 ft.

Comments: Three plans and section. Despite the title, the building shown may well have been the *north* cavalier. In any case, neither the north nor the south cavalier was ever built.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 14-1832-2-5.
Title: "Elevation of South West Bastion N° 7"; "Elevation of North West Bastion N° 6."
Signature and date: Boteler, 14 Feb. 1832.
Scale: 1 in. to 10 ft.
Comments: Two elevations and a site plan. The elevations show the cracks and failures in the masonry and the notation on the plan gives the dates of construction.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 13-1832-2-6.
Title: "N° 8 / Elevation of Gorge of West Ravelin."
Signature and date: Boteler, 14 Feb. 1832.
Scale: 1 in. to 10 ft.
Comments: Elevation and ten sections. The elevation shows the state of the west ravelin gorge. The ten sections are as follows:
(*1*) Escarp, northwest and southwest bastions as built in 1829.
(*2*) Escarp, left face, northeast and right face, southeast bastions as built in 1830.
(*3*) Escarp, right face, northeast and left face, southeast bastions as built in 1831.
(*4*) Escarp, west curtain, as built in 1831.
(*5*) Escarp, left face, northwest bastion, as rebuilt in 1831.
(*6*) Escarp, west ravelin, as built in 1829.
(*7*) Escarp, north ravelin, as built in 1831.
(*8*) Counterscarp and gallery, southwest bastion and west ravelin, as built in 1829 and 1830.
(*9*) Northwest bastion counterscarp (without gallery or coping) as built in 1831.
(*10*) South front counterscarp (without gallery or coping) as built in 1831.
There are also dimensions given for the counterfort.
Source: Public Record Office, London (WO78, No. 1679, MPHH205).

Code: 15-1832-4-1.
Title: "Fort George, Halifax N.S. / Plan and section of the casemates of reverse fire / Counterscarp main Ditch."
Signature and date: Boteler, 14 April 1832.
Scale: 1 in. to 10 ft.
Comments: Plan and two sections, showing countermines. The sections detail two alternative arrangements for the level of the gallery. The gallery was ultimately constructed in a different manner (*see* plan 15-1838-13-1). The bend in the counterscarp wall shown in this plan was ultimately incorporated into the final plan.
Source: Public Record Office, London (WO78, No. 1667, MPH486).

Code: 02-1832-4-2.
Title: "Transverse Section of Fort George shewing the elevation of the / alteration proposed to the eastern front by Colonel Nicolls' Letter of 5th Sept. 1831, as also if carried only to the extent of the Ravelin / of the original Plan. Both constructed on the same plane as the Eastern half of the work."
Signature and date: Boteler, 19 April 1832.
Scale: 1 in. to 30 ft.
Comments: Two sections detailing alternative proposals for the redan. Neither section is entirely like the redan as it was actually constructed, but the first (Nicolls's proposal) is closer. The counterscarp was not constructed in the manner described, and neither the countermines nor the glacis coupé was ever built. This plan is interesting for the light it throws on the problems involved in the formation of a glacis on the eastern front.
Source: Public Record Office, London (WO78, No. 1667, MPH486).

Code: 15-1832-5-1.
Title: "Sketch of the proposed construction of the / Casemates for reverse fire in front of the North West / Bastion, Fort George, Halifax."
Signature and date: "To accompany Sir A. Bryce's orders in Lieutenant Colonel Fanshawe's letter of 25 May 1832."
Scale: 1 in. to 10 ft.
Comments: Plan and section. A proposal to complete the counterscarp gallery in a series of arched compartments. This method of construction was ultimately adopted, but the line of the gallery

opposite the northwest demi-bastion was eventually altered (compare plans 15-1832-4-1 and 15-1838-13-1).
Source: Public Record Office, London (WO78, No. 1667, MPH486).

Plans 04-1833-6-1 to 15-1834-6-9 (nine plans).
These nine plans are all from Lieutenant Colonel Boteler's first estimate for the completion of the Citadel, transmitted on 12 June 1833. The originals went down with the *Calypso*; these are copies. As none of the works was approved, these plans are interesting only for their description of work already constructed and for their illustration of the extent to which Boteler influenced his successors.
Code: 04-1833-6-1.
Title: "Longitudinal Section through the Casemates proposed / for the North, South and West Fronts."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section with reference notes. The escarp wall shown had already been constructed.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 289).
Code: 04-1833-6-2.
Title: "Transverse Section through two of the Casemates proposed for / the North and South fronts."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section with reference notes.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 290).

Code: 06-1833-6-3.
Title: "Transverse Section through one of the Magazines / proposed to be placed in the N.W. & S.W. Bastions."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section with reference notes. The magazine proposed was to be composed of two linked subterranean casemates. A similar scheme was put forward in the initial version of Jones's revised estimate (*see* plan 06-1834-3-6).
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 292).
Code: 11-1833-6-4.
Title: "Retaining Wall of Rampart, West Front."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. No retaining wall of this description was ever built.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 293).
Code: 11-1833-6-5.
Title: "Retaining wall of Rampart / Eastern front."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. No retaining wall of this description was ever built.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 295).

Code: 14-1833-6-6.
Title: Section of escarp, eastern front, and section of main drain.
Signature and date: No signature. Dated 15 March 1834.
Scale: Escarp, 1 in. to 10 ft.; drain, 1 in. to 4 ft.
Comments: One section of each.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 297).
Code: 15-1833-6-7.
Title: "Counterscarp for the Eastern front without Gallery or Mines."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. No counterscarp of this type was ever constructed.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 305).
Code: 15-1833-6-8.
Title: "Counterscarp and Gallery to complete North front."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 306).
Code: 15-1833-6-9.
Title: "Counterscarp, South front, with Counterforts."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. No counterscarp of this description was ever built.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 307).

Plans 11-1833-6-10 to 15-1833-6-13 (4 plans).

These four are from Boteler's second estimate (12 June 1833).

Code: 11-1833-6-10.
Title: "Retaining Wall of Rampart for North, South & West / fronts, if no new Casemates."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. No retaining wall of this description was ever built.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 325).

Code: 15-1833-6-11.
Title: "Counterscarp, Eastern Front / with Gallery and Mines."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 328).

Code: 15-1833-6-12.
Title: "Counterscarp, South Front / with Gallery and Mines."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 329).

Code: 15-1833-6-13.
Title: "Counterscarp, South Ravelin / with Gallery and Mines."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 330).

Code: 14-1833-6-14.
Title: "Present Escarp to be taken down" and "Escarp proposed."
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Two sections from Boteler's third estimate for repairs (transmitted 12 June 1833). The first section is of an already completed escarp, apparently in the west curtain.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 334).

Plans 15-1833-6-15 to 28-1833-6-18 (4 plans).

These four plans are from the first of Lieutenant Peake's estimates for alterations and repairs (6 June 1833). Like Boteler's estimates, they were never approved.

Code: 15-1833-6-15.
Title: Plan, sections of counterscarp.
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 8 ft.
Comments: Plan, two sections of a segmental counterscarp gallery. Compare Colonel Jones's plan of same (plan 15-1834-3-4).
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 344).

Code: 11-1833-6-16.
Title: Section of retaining wall, west ramparts.
Signature and date: No signature. Dated 15 March 1834.
Scale: 1 in. to 8 ft.
Comments: Plan and section of retaining wall with arched recesses. This was the origin of the scheme finally adopted.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 346).

Code: 14-1833-6-17.
Title: "Retaining Wall of Ramparts proposed for the Redan," and "Escarp proposed for the Redan."
Signature and date: No signature. Dated 15 March 1834.
Scale: Not given.
Comments: Two sections. No retaining wall was ever built to this specification. The redan counterscarp was altered by the addition of casemating.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 351).

Code: 28-1833-6-18.
Title: "Main Drain . . . proposed to be built according / to [this] section. – and in the lines / & manner shewn upon Plan N° 1."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 4 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 353).

Code: 01-1833-13-1.
Title: "Part of the Common & Citadel Hill, / Shewing the Position of Fort George / and in yellow the new line of Road."
Signature and date: Wentworth, no date.
Scale: 1 in. to 200 ft.

Comments: Details a scheme to relocate the roads on the Common. The Citadel is shown in outline only. The east front is not shown at all.
Source: Public Archives of Canada (MG12, WO44, Vol. 213, fol. 39).

Plans 14-1834-3-1 to 13-1834-3-9 (nine plans).
These nine are from the first version of Lieutenant Colonel Jones's revised estimate. Some were approved; others were deleted, changed, or not carried out. Comparison should be made with the plans from the approved version of the estimate (*see* plans 06-1836-2-1 and following).

Code: 14-1834-3-1.
Title: Section of escarp, eastern front, and section of main drain.
Signature and date: Wentworth, 15 March 1834.
Scale: Escarp, 1 in. to 10 ft.; drain, 1 in. to 4 ft.
Comments: Section and elevation of proposed redan escarp and section of proposed main drain. *Compare* plan 28-1836-2-3.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 251).

Code: 11-1834-3-2.
Title: Plan, section and elevation of retaining wall, east front.
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: The title is self-explanatory.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 254).

Code: 14-1834-3-3.
Title: "Escarp, South Ravelin."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: The title is self-explanatory.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 258).

Code: 15-1834-3-4.
Title: "Counterscarp with Gallery, Eastern Front. –"
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 259).

Code: 29-1834-3-5.
Title: "Section of Caponnieres."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. The caponiers were, of course, never built.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 264).

Code: 06-1834-3-6.
Title: "Section through one of the Magazines."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section. The magazine shown here consists of two linked subterranean casemates (*compare* plan 06-1833-6-3). This proposal was not accepted, and the present magazines were substituted in the revision of this estimate (*see* plan 06-1836-2-1).
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 265).

Code: 03-1834-3-7.
Title: "South End of Cavalier, Fort George, Halifax / shewing proposed addition as recommended / in Lieutenant General Pilkington's Report to the Master General / 4th June 1834."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections and elevation.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 266).

Code: 14-1834-3-8.
Title: "Escarp to be taken down.", "Escarp proposed."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: The escarp to be taken down was in the northwest bastion.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 271).

Code: 13-1834-3-9.
Title:"Gorge proposed for West Ravelin."
Signature and date: Wentworth, 15 March 1834.
Scale: 1 in. to 10 ft.
Comments: Section.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 272).

Code: 01-1835-11-1.
Title: "Plan of the ground in the vicinity of the Citadel / of Halifax Nova Scotia shewing the relative / situation of the portions proposed to be exchanged for a public cemetary."

Signature and date: Two signatures. (1) Jones, 28 Nov. 1835; (2) Wm. Blackman (copyist), 13 July 1921.
Scale: 1 in. to 200 ft.
Comments: The title is self-explanatory. The plan shows the Citadel site but not the Citadel itself.
Source: Public Archives of Canada, National Map Collection.

Plans 06-1836-2-1 to 13-1836-2-16 (16 plans).

These 16 are from the revised (1836) version of Jones's estimate. Most are similar to the first set of plans submitted with the earlier version (1834). With the exceptions noted, most of the works described were actually constructed to these specifications.

Code: 06-1836-2-1.
Title: Two sections of magazine.
Signature and date: Wentworth. No date.
Scale: 1 in. to 10 ft.
Comments: Two sections. These show the magazine as designed after London had rejected the first proposal for the building (*see* plan 06-1834-3-6). The first section shows the first revised proposal, in which the magazine is shown as having external buttresses. The second section shows the magazine without buttresses, and it was this version which was finally accepted. Both sections show the adjoining retaining wall and area wall.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 666).

Code: 03-1836-2-2.
Title: "Plan and Sections for completing the present Cavalier as a Soldier's Barrack / according to the Original Project and Estimate / and also for adding cooking houses on the North and South / ends, in the manner shown on Plan No. 1 . . ."
Signature and date: Wentworth, 1 Feb. 1836.
Scale: 1 in. to 10 ft.
Comments: Plan and section of additions as finally approved.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 668).

Code: 28-1836-2-3.
Title: Two sections, main drain, and elevation of escarp.
Signature and date: Wentworth, 1 Feb. 1836.
Scale: 1 in. to 2 ft.
Comments: Two sections of drain and elevation of escarp. The sections show two different versions of the drain. The version with the curved floor was the one accepted.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 639).

Code: 11-1836-2-4.
Title: Rampart retaining wall.
Signature and date: Wentworth, no date. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Plan and section of rampart retaining wall, eastern front.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 644).

Code: 11-1836-2-5.
Title: "Front elevation of retaining wall" and "Longitudinal Section of retaining wall."
Signature and date: Wentworth, no date. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Elevation and section of retaining wall, north, south and west fronts. On the north front, casemating was ultimately used.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 647).

Code: 13-1836-2-6.
Title: "Section of Gorge remaining to be built."
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of the gorge wall of the north ravelin.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 649).

Code: 13-1836-2-7.
Title: Escarp section, counterforts and parapet.
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of south ravelin escarp with counterforts, parapet wall.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 651).

Code: 15-1836-2-8.
Title: Counterscarp and gallery.
Signature and date: Wentworth, no date. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Plan and section of counterscarp and gallery, eastern front.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 653).

Code: 15-1836-2-9.
Title: None, and "Section of part to complete according / to the original plan."
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Plan and section of counterscarp and gallery, north front. The gallery described here is of

the segmental type. In addition, there is a section of the old continuous-arch gallery, apparently also intended for the northern front.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 655).
Code: 15-1836-2-10.
Title: None, and "Counterscarp to complete on the original Section, – the dark red / shewing the part already built."
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: Not given. [1 in. to 10 ft.]
Comments: Plan and section of counterscarp and gallery, southern front, to be constructed according to the segmental pattern. Also, plan and section of a portion of the counterscarp and gallery, southern front, to be constructed according to the original continuous-arch pattern.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 657).
Code: 15-1836-2-11.
Title: Section of counterscarp and gallery.
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of counterscarp and gallery (segmental) for western front.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 659).
Code: 15-1836-2-12.
Title: None, and "Counterscarp to complete on the original Section, the dark red / shewing the part already built."
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of counterscarp and gallery (segmental) for opposite the south ravelin. There is also a section of the counterscarp and gallery (continuous arch) for the same front, to be completed according to the original plan.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 661).
Code: 04-1836-2-13.
Title: "F, F, F, Casemates for Stores, – see Plan N° 1. –"
Signature and date: Wentworth, no date [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Longitudinal section of Nos. 18–20.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 664).
Code: 03-1836-2-14.
Title: Section of cavalier casemates.
Signature and date: Wentworth, no date. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Longitudinal section of the south end casemates of the cavalier, showing ovens, chimneys, etc.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 670).
Code: 14-1836-2-15.
Title: "Escarp Proposed" and "Present Escarp".
Signature and date: Wentworth, no date. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of the escarp as built in the western bastions, and of the escarp proposed for its replacement.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 674).
Code: 13-1836-2-16.
Title: Gorge wall, west ravelin.
Signature and date: None. [Jones, 1 Feb. 1836.]
Scale: 1 in. to 10 ft.
Comments: Section of gorge wall proposed for the west ravelin. For the west ravelin gorge wall as finally reconstructed, *see* plan 13-1846-3-4.
Source: Public Archives of Canada (MG12, WO55, Vol. 873, fol. 676).

Code: 15-1838-13-1.
Title: Plan and elevation of counterscarp.
Signature and date: No signature. Dated 1838.
Scale: 1 in. to 20 ft.
Comments: Plan and elevation of counterscarp opposite the northwest demi-bastion. This shows the foundation and the drain. It also shows the counterscarp in the course of erection, and is a plan of it as built.
Source: Public Archives of Nova Scotia (RE20, unpaginated).

Plans 04-1843-5-1 to 03-1843-5-5 (five plans).
These five are from Calder's 1843 estimate. All five were approved and constructed.
Code: 04-1843-5-1.
Title: "Sketch of the North East and North Fronts of the Citadel shewing the / additional casemates proposed in the Comm^{dg}. Engineer's letter dated / 6th January 1843; the part of the Scarp it is necessary to take down and / rebuild; and the area wall of the Casemates of Defence in North / West Bastion which it was necessary to take down . . ."

Signature and date: Calder, 22 May 1843.
Scale: 1 in. to 40 ft. and 1 in. to 10 ft.
Comments: Plan, three sections and reference notes. The plan shows the casemates proposed or built in the northeast salient and adjoining demi-bastion. The sections are as follows:
(1) Section of right face, northwest demi-bastion.
(2) Section of left face, northeast salient, showing the escarp proposed for a casemated rampart.
(3) Longitudinal section of three casemates.
Source: Public Archives of Canada (MG12, WO55, Vol. 878, fol. 516A).

Code: 06-1843-5-2.
Title: "Plan of one of the Magazines shewing the proposed / Porches, Ventilators and Shifting Room . . ."
Signature and date: Calder, 22 May 1843.
Scale: 1 in. to 10 ft.
Comments: Plan of magazines, area and shifting room; section of shifting room.
Source: Public Archives of Canada (MG12, WO55, Vol. 878, fol. 517A).

Code: 08-1843-5-3.
Title: "Plan and Section of the proposed Retaining Wall of the Area of the Casemates / of defence N.W. Bastion, the steps to be of wood as in the S.W. Bastion."
Signature and date: Calder, 22 May 1843.
Scale: 1 in. to 10 ft.
Comments: Plan, showing part of adjoining casemates; section of wall.
Source: Public Archives of Canada (MG12, WO55, Vol. 878, fol. 519A).

Code: 09-1843-5-4.
Title: "Sketch of Vaults or Cellars / for Officers' Barracks."
Signature and date: Willingham and Calder, 22 May 1843.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections.
Source: Public Archives of Canada (MG12, WO55, Vol. 878, fol. 520A).

Code: 03-1843-5-5.
Title: "Sketch of the room over the South Cooking / Casemate shewing how it is intended to / appropriate it," and "Sketch of the room over the North Cooking Casemate / shewing how it is proposed to fit it up for Cells / for solitary confinement."
Signature and date: Calder, 22 May 1843.
Scale: 1 in. to 10 ft.
Comments: Plan of rooms over south casemate; plan and section of cells.
Source: Public Archives of Canada (MG12, WO55, Vol. 878, fol. 521A).

Code: 04-1844-3-1.
Title: "Plan of Upper Floor of Redan, Halifax Citadel / shewing the Partitions proposed in the Officer's / Rooms."
Signature and date: Calder, 29 March 1844.
Scale: 1 in. to 10 ft.
Comments: Plan only. This was the proposal adopted.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 65).

Code: 04-1844-3-2.
Title: "Plan of the basement floor / of the Redan Halifax Citadel / shewing the partitions proposed / in the Servants Rooms &c."
Signature and date: Calder, 29 March 1844.
Scale: 1 in. to 10 ft.
Comments: Plan only. This was the proposal adopted.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 66).

Code: 04-1844-4-1.
Title: "Redan – Halifax Citadel. / Tracing from Lieutenant Colonel Rice Jones' Plan / dated 1st Feb^{y} 1836."
Signature and date: None, but noted as being transmitted with IGF's letter of 7 May 1844.
Scale: 1 in. to 10 ft.
Comments: Plan of upper floor of redan casemates. This arrangement was not adopted.
Source: Public Archives of Nova Scotia.

Code: 04-1844-6-1.
Title: "Copy of a sketch by the late Captain Wentworth R.E.," "Plan of Officers Casemates."
Signature and date: Calder, 15 June 1844.
Scale: Not given.
Comments: Plan only. This shows an arrangement which was superceded by that shown in plan 04-1844-3-1.
Source: Public Archives of Canada (MG12, WO44, Vol. 227, fol. 69).

Code: 04-1845-11-1.

Title: "Nº 1 [?] / Plan of the Casemates in the Citadel at Halifax N.S. / used as a strong room & guard house." "To accompany the C.R.E.'s / memorandum dated 24 Nov. 1848."

Signature and date: None. *See* date above.

Scale: 1 in. to 10 ft.

Comments: Plan showing fitments of casemates 54-5.

Source: Public Archives of Canada (RG8, C series, Vol. 1825, p. 13).

Code: 01-1845-11-2.

Title: "Ground Plan of the Interior of the Citadel of Halifax N.S. / To accompany CRE's Memº dated Nov. 24th/1845."

Signature and date: None.

Scale: 1 in. to 40 ft.

Comments: Outline plan of parade. No detail.

Source: Public Archives of Canada (RG8, C series, Vol. 1825, p. 14).

Plans 01-1846-3-1 to 26-1846-3-16 (16 plans).

These 16 plans illustrate the items of the 1846 supplementary estimate.

Code: 01-1846-3-1 (3-1A).

Title: "General Plan shewing the Relative / Positions of the Services brought forward in / Supplementary Estimate / To Accompany the Supplementary Estimate / Dated 31st. March, 1846."

Signature and date: Calder, 31 March 1846.

Scale: 1 in. to 40 ft.

Comments: Block plan. Title is self-explanatory (*see* below).

Source: Public Archives of Canada (MG12, WO55, Vol. 880, fols. 1002, 1018).

Code: 08-1846-3-2.

Title: "Plan, Elevation and Section of / Retaining Wall to two Casemates / of Defence North West Bastion . . ."

Signature and date: Calder, 31 March 1846.

Scale: 1 in. to 10 ft.

Comments: Plan, elevation and section. The elevation shows the doors, windows and ventilators of casemates 12 and 13.

Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 960).

Code: 11-1846-3-3.

Title: "Plan, Elevation and Section of / Retaining Wall to be rebuilt to 4 / Casemates of Defence West Face . . ."

Signature and date: Calder, 31 March 1846.

Scale: 1 in. to 10 ft.

Comments: Plan, elevation and section. The section shows the ventilation system of the casemates behind the retaining wall (the casemates involved are Nos. 3, 4, 8 and 9). The elevation shows the doors, windows and ventilators of the casemates.

Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 961).

Code: 13-1846-3-4 (3-4A).

Title: "Plan Elevation and Sections of West / Ravelin and Guard House proposed / to be taken down and rebuilt . . ."

Signature and date: Calder, 31 March 1846.

Scale: 1 in. to 10 ft. and 1 in. to 20 ft.

Comments: 3-4 has a plan of the ravelin, showing both ramparts and escarp and gorge walls, a section of the guardhouse, a section of a gun platform, a section of the escarp, a section of the gorge wall, and an elevation of the gorge. In addition to the above, 3-4A has inserts showing the area wall in section. These two are our best plans of any of the ravelins.

Source: Public Archives of Canada (MG12, WO55, Vol. 880, fols. 962, 1005).

Code: 28-1846-3-5.

Title: "Plan and Elevation shewing the proposed method / of supplying the Water Tank with the surface water / from Terreplein . . . / also Plan and section of Hopper and Pipe to be inserted in / surface drain to convey Water to main pipe . . ."

Signature and date: Calder, 31 March 1846.

Scale: 1 in. to 40 ft. and 1 in. to 1 ft.

Comments: Plan, elevation and section of hopper head and drawing of pipe elbow. The elevation shows the entire rampart retaining wall from casemate No. 15 to No. 50 (i.e., from the north magazine to the south redan re-entrant). The water system proposed here was later much modified (*see* plan 01-1858-8-3).

Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 964).

Code: 04-1846-3-6.

Title: "Plan and Sections of Tanks / for a better supply of Water proposed / to be constructed under Gun Room / marked A East Front . . ."

Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections. This details a proposal for the installation of water tanks under casemate No. 50. The proposal was never adopted. The plan and section show casemates 49 and 50 and the well in No. 49.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 963).

Code: 28-1846-3-7.
Title: "Plan and Section of Proposed Underground / Communication from the Gallery North Front / to the Well on the Glacis . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 10 ft.
Comments: Plan and section. The proposed passage was never built. The plan does provide some detail of the counterscarp and gallery at the northeast salient.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 965).

Code: 08-1846-3-8 (3-8A).
Title: "Plan of the proposed flagging / to Areas of North & South / Magazine . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 20 ft.
Comments: Plan. Shows magazine, area and shifting room. The flagging was never applied; instead asphalt was substituted. 3-8A is slightly different in some details.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fols. 996, 1009).

Code: 06-1846-3-9.
Title: "Plan and Elevation showing the / Situation of Proposed Lightning / Conductors to the Magazines . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 10 ft. and 1 in. to 20 ft.
Comments: Plan and elevation. Plan is of magazine, area and shifting room. Elevation shows steps to ramparts. The lightning conductors proved a failure when applied in this manner, and a different arrangement was substituted (*see* plan 06-1858-8-1).
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 967).

Code: 28-1846-3-10 (3-10A).
Title: "Elevation and Section of Proposed / Hopper Heads to enclose Weepers . . ."
Signature and date: Calder, 31 March 1846.
Scale: 3 in. to 1 ft.
Comments: Elevation and section: 3-10A differs slightly in detail.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fols. 968, 1011).

Code: 03-1846-3-11.
Title: "Plan and Section of the top of the Cavalier showing the proposed / arrangement of Seven Guns also the Flagging and Counter-flagging / of Arches over the existing Tiles . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 10 ft.
Comments: Plan and section. The section shows the foundations for the pivots and racers of two of the guns. The method of flagging and counterflagging was later tried in the ramparts casemates.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 969).

Code: 27-1846-3-12.
Title: "Plan, Elevation and Section of / Proposed Cast Iron Cantilever Shelving . . ."
Signature and date: Calder, 31 March 1846.
Scale: 3 in. to 1 ft.
Comments: Plan, elevation, section and reference notes.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 1013).

Code: 28-1846-3-13 (3-13A).
Title: "Plan, Elevation and Section / of Proposed Fence with Gate to / enclose the Glacis . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 5 ft.
Comments: Elevation, section, elevation of gate, site plan, reference notes. The fence was never constructed. 3-13A is slightly different.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fols. 970, 1014).

Code: 26-1846-3-14.
Title: "Plan and Section of Proposed / Curbs for Traversing Platforms . . ."
Signature and date: Calder, 31 March 1846.
Scale: 1 in. to 4 ft.
Comments: Plan and section of segmental curb. The section shows the foundations.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 971).

Code: 26-1846-3-15.
Title: "Plan and section of Proposed / Curbs for Traversing Platforms . . ."
Signature and date: Calder, 31 March 1846..
Scale: Not given.
Comments: Plan and section of circular curb.
Source: Public Archives of Canada (MG12, WO55, Vol. 880, fol. 972).
Code: 26-1846-3-16.
Title: "Plan and Section of a Proposed / Ground Platform for a Garrison / Carriage . . ."
Signature and date: No signature. Dated 31 March 1846.
Scale: Not given.
Comments: Plan and section; both show the parapet and embrasure.
Source: Public Archives of Canada (MG12, WO5, Vol. 880, fol. 973).

Code: 05-1847-4-1.
Title: "Plan to accompany the Report on the Demolition of the old Magazine in the Citadel at Halifax, Nova Scotia."
Signature and date: Phillpotts, 7 April 1847.
Scale: Not given.
Comments: Plan, section and two views of the ruins. The plan and section show the method of placing the charges. One of the views shows the end of the cavalier and establishes that the cavalier, in 1847, had a hipped shingle roof.
Source: Public Archives of Canada (MG12, WO55, Vol. 881, fol. 855).

Code: 01-1847-8-1.
Title: "Plan shewing the Relative Situation of Proposed / Cells for Solitary Confinement . . ."
Signature and date: Calder, 7 August 1847.
Scale: 1 in. to 40 ft.
Comments: Plan of entire south end of fort. Despite the title, this version of the plan does *not* show the location of the proposed cells.
Source: Public Archives of Canada (MG12, WO55, Vol. 882, fol. 405).
Code: 28-1847-8-2.
Title: "Halifax Citadel / Nova Scotia / Solitary Cells."
Signature and date: Calder, 7 August 1847.
Scale: 1 in. to 10 ft. and 1 in. to 8 ft.
Comments: Two plans, two sections, elevation and reference notes. This shows the first version of the design intended for the south side of the southeast salient (*see* plan 28-1847-11-1, below).
Source: Public Archives of Canada (MG12, WO55, Vol. 882, fol. 860).
Code: 28-1847-11-1.
Title: "Halifax Citadel / Solitary Cells."
Signature and date: Calder, 15 Nov. 1847.
Scale: 1 in. to 10 ft.
Comments: Two plans, two sections and elevation. This shows a slightly more elaborate version of the preceding plan, intended for the east side of the southeast salient. Neither this nor the preceding was ever built.
Source: Public Archives of Canada (MG12, WO55, Vol. 882, fol. 406).

Code: 01-1847-12-1 (12-1A).
Title: "Ground Plan / of / Fort George or the Citadel / Halifax N.S. / from actual measurement / shewing the state of the work / Dec. 31. 1847 / (Fort George) Halifax Citadel."
Signature and date: 12-1, Calder, 10 March 1848. 12-1A, J. R. LaPlante (copyist), October 1961.
Scale: 1 in. to 40 ft.
Comments: Ground plan with reference notes. This is probably the best-known of all the Citadel plans and also one of the best. It shows the subterranean features as they existed in 1847. 12-1A is a modern retracing with some information interpolated from other sources. The original plan is very faded.
Source: 12-1; Public Archives of Nova Scotia. 12-1A; Public Archives of Canada, National Map Collection.

Code: 04-1848-2-1.
Title: Plan and section of counterflagging in dos d'anes.
Signature and date: No signature. Dated 1848.
Scale: Not given.
Comments: Plan and section sketched in the blank half-margin of a letter. *See* plan 01-1848-12-1 and following for further information.
Source: Public Archives of Canada (MG12, WO55, Vol. 882, fol. 475).

Plans 01-1848-12-1 to 11-1848-12-5 (5 plans).
These five were sent with Colonel Savage's letter of 28 December 1848 reporting on the state of the casemates. They contain the first clear

indication of the materials used on the dos d'anes, and are important sources for the history of the casemate waterproofing. They should be compared with plans 01-1849-4-1 and following, and with plan 04-1854-6-1. (*See also* ". . . the necessity of remedying the leakage. . . .")

Code: 01-1848-12-1.
Title: "Ground Plan Shewing the Casemates Numbered 1 to 54 / and the situation of the Proposed Down Pipes and Drainage / to carry off the Water from the Vallies between the / Dos d'Anes . . ."
Signature and date: Savage, 28 Dec. 1848.
Scale: 1 in. to 40 ft.
Comments: Plan. This plan shows the proposed drainage system and the contemporary numbering system for the casemates. The former was much altered in the course of installation (*see* plan 01-1858-8-3).
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 835).

Code: 04-1848-12-2.
Title: "Plan and Sections shewing Casemates / Flagged, Hipped and Piped; Flagged / and Hipped; and Flagged Only . . ."
Signature and date: Savage, 28 Dec. 1848.
Scale: 1 in. to 8 ft.
Comments: Plan and section. Plan shows dos d'anes, and section shows entire casemate (a block of six is shown). No fewer than three different drainage systems are illustrated.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 836).

Code: 04-1848-12-3.
Title: "Longitudinal Section . . . shewing Casemates / Flagged Hipped and Piped; Flagged and Hipped; and Flagged only . . ."
Signature and date: Savage, 28 Dec. 1848.
Scale: 1 in. to 8 ft.
Comments: Three sections keyed to plan 04-1848-12-2.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 837).

Code: 04-1848-12-4.
Title: "Plan and section shewing the Method / Improvised by Colonel Savage . . . to prevent the Casemates from Leakage / at this Station . . ."
Signature and date: Savage, 28 Dec. 1848.
Scale: 1 in. to 8 ft.
Comments: Plan, two sections. The title is self-explanatory. The interior drainage system illustrated involved cutting a hole through the haunch of the casemate arch and taking the pipe down one of the outside corners of the casemate.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 838).

Code: 1-1848-12-5.
Title: "Section of the Redan, Officers Quarters / shewing the Coping of the Retaining Wall as executed / and the dotted lines as Recommended / to be carried up . . ."
Signature and date: Savage, 28 Dec. 1848.
Scale: 1 in. to 10 ft.
Comments: Section of entire casemate on a very small scale. Few details.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 839).

Code: 01-1849-1-1.
Title: "Citadel / Halifax N.S. / to accompany Return / shewing the Proposed Appropriation . . ."
Signature and date: Savage, 9 Jan. 1849.
Scale: 1 in. to 40 ft.
Comments: Large-scale ground plan showing casemate numbering. Similar to plan 01-1847-12-1 and somewhat clearer.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 781).

Code: 01-1849-1-2.
Title: General plan.
Signature and date: Savage, 9 Jan. 1849.
Scale: 1 in. to 200 ft.
Comments: A small-scale site plan. No detail.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 782).

Plans 01-1849-4-1 to 01-1849-4-8 (eight plans).
These eight plans were drawn to accompany Colonel Savage's staunching estimate of 30 April 1849. They should be compared with plans 01-1848-12-1 and following, and with plan 04-1854-6-1. (*See* ". . . the necessity of remedying the leakage. . . .")

Code: 01-1849-4-1.
Title: "Ground Plan / Fort George or the Citadel / Halifax N.S. / Shewing the position of the Proposed Pipes and Drains with respect / to the Mode proposed for Staunching the leakage in / the Arches of the Casemates and / for providing against a similar contingency in the Cavalier . . ."
Signature and date: Savage, 30 April 1849.

Scale: Not given.
Comments: Plan and reference notes. The title is self-explanatory. The system detailed here was later much altered. *See* plan 01-1858-8-3.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 856).

Code: 01-1849-4-2.
Title: "Plan shewing the mode proposed for staunching / the leakage in the Arches of the Casemates / . . ."
Signature and date: Savage, 30 April 1849.
Scale: 1 in. to 40 ft.
Comments: Plan and reference notes. The plan shows the ramparts cut away to reveal the dos d'anes of the casemates underneath. It is the only one of its kind. Only the shifting rooms (Nos. 14 and 58) and the privies (Nos. 6, 7A and 42) and Nos. 1–2, 10–11 and 56–7 are not shown. The cavalier casemate dos d'anes are also shown.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 857).

Code: 04-1849-4-3.
Title: "Sections . . . shewing the / mode proposed for staunching the leakage in the / Arches of the Casemates. . . ."
Signature and date: Savage, 30 April 1849.
Scale: 1 in. to 10 ft.
Comments: Seven sections, two figures, reference notes and pencil annotations. The seven sections are Nos. 47, 57, 60, 3, 20 and 27 (of which there are two sections). All of the sections are very detailed and show doors, windows, fireplaces, chimneys, etc. The two figures show details of the drain pipes. The pencil annotations, made in London, show some of the alterations later made in this scheme.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 858).

Code: 03-1849-4-4.
Title: "Sections of Cavalier showing the mode proposed for / rendering the arches secure against / leakage by the introduction of pipes and drains . . ."
Signature and date: Savage, 30 April 1849.
Scale: 1 in. to 10 ft.
Comments: Two sections of the cavalier casemates. In addition to the drainage system, the sections show doors, windows, fireplaces, etc. They are especially good as regards the veranda and veranda staircase.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 859).

Code: 01-1849-4-5.
Title: "Plan shewing the position of the proposed granite / Surface Gutters / with reference to the project for / Staunching the Casemates . . ."
Signature and date: Savage, 30 April 1849.
Scale: 1 in. to 40 ft.
Comments: General plan, reference notes. The gutters were built in the manner described here.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 860).

Code: 11-1849-4-6.
Title: Sections of gargoyles and plan of surface gutter.
Signature and date: None. [Savage, 30 April 1849.]
Scale: Not given.
Comments: Two small sections of a gargoyle and one small plan showing the surface gutter behind the rampart retaining wall and the upper portion of the wall. These are included in the text of Savage's staunching estimate of 30 April 1849.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 854).

Code: 28-1849-4-7.
Title: Sections of gutter and hopper heads.
Signature and date: None. [Savage, 30 April 1849.]
Scale: Not given.
Comments: Small section of gutter and hopper heads given in the text of the estimate.
Source: Public Archives of Canada (MG12, WO55, Vol. 883).

Code: 28-1849-4-8.
Title: Gutter for casemate.
Signature and date: None. [Savage, 30 April 1849.]
Scale: Not given.
Comments: Small section of casemate gutter within the text of the estimate.
Source: Public Archives of Canada (MG12, WO55, Vol. 883).

Code: 26-1849-13-1.
Title: "Siege Gun Platform."
Signature and date: No signature. Dated 1849.
Scale: 1 in. to 12 ft.
Comments: Plan, section and details.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 719).

Code: 26-1849-13-2.
Title: "Siege Mortar Platform."
Signature and date: No signature. Dated 1849.
Scale: 1 in. to 12 ft.
Comments: Two plans, one of a platform for 10-inch mortars, the other 13-inch mortars.
Source: Public Archives of Canada (MG12, WO55, Vol. 883, fol. 720)

Code: 24-1850-1-1.
Title: "Working Drawing / of / Standing Bridge."
Signature and date: Savage, 7 Jan. 1850.
Scale: 1/2 in. to 1 ft.
Comments: Two sections. The bridge was built to this specification.
Source: Public Archives of Nova Scotia.

Code: 24-1850-1-2.
Title: "Working Drawing / of / Draw Bridge."
Signature and date: Savage, 7 Jan. 1850.
Scale: Varies.
Comments: Plan, sections and detail. The bridge was built to this specification.
Source: Public Archives of Nova Scotia.

Code: 01-1851-11-1.
Title: "Halifax. N.S."
Signature and date: Savage, 13 Nov. 1851.
Scale: 1 in. to 200 ft.
Comments: Plan showing barrack accommodation in the Citadel and vicinity, and table detailing accommodation in each building.
Source: Public Archives of Canada (National Map Collection, H4/250).

Code: 06-1852-1-1.
Title: "Halifax N.S. / Plan and Section of the Gunpowder Magazine / at the / Citadel."
Signature and date: Savage, 21 Jan. 1852.
Scale: 1 in. to 20 ft.
Comments: Plan, two sections and reference notes. The sections show the arrangement of the powder racks as then in use and as proposed.
Source: Public Archives of Canada (MG12, WO44, Vol. 235, fol. 188).

Code: 01-1852-4-1 (4-1A).
Title: "Surface Plan / of Fort George or the Citadel / Halifax N.S. / Record plan from actual measurement / in compliance with the CRE's order 12th April 1852." Title of 4-1A: "Gun Positions / Halifax Citadel / From Record Plan of 1852 / in Public Archives of Canada / Reference D250."
Signature and date: 4-1; none (*see* above). 4-1A; none.
Scale: 4-1; 1 in. to 40 ft. 4-1A; 1 in. to ca. 65 ft.
Comments: Surface plan, showing armament positions. Despite the legend, the latter could not conceivably be "from actual measurement" since the ramparts were not yet complete in 1852 (*see* ". . . and keep your powder dry!"). 4-1A is a modern redrawing.
Source: 4-1 and 4-1A: Public Archives of Canada, National Map Collection.

Code: 02-1852-4-2 (4-2A, 4-2B).
Title: 4-2: "Section and Elevations / of / Fort George or the Citadel / at Halifax N.S. / Record Plan from actual measurement / In compliance with the C.R.E.'s order 12 April 1852." 4-2A; "Halifax Citadel / Rampart Profiles / from Record Plan, 1852 . . ." 4-2B: "Citadel (Fort George) / Halifax N.S. / Section & Elevations in 1847."
Signature and date: 4-2: none. 4-2A: none. 4-2B: retraced by J. M. LaPlante, October 1961.
Scale: 4-2: 1 in. to 40 ft. 4-2A: 1 in. to 20 ft. 4-2B: 1 in. to 40 ft.
Comments: 4-2 contains eight sections and elevations, including the following:
(*1*) East-west section through the fort, showing sections of counterscarp gallery, redan casemates, rainwater tanks, cavalier, west curtain, ravelin guardhouse, west ravelin escarp, etc.
(*2*) North-south section of south ravelin, south sally port, two casemates in the south front, shifting room; elevation of south magazine (without area wall), elevation of south end of curtain, section of cavalier, elevation of north magazine (with area wall), sections of north front, north ravelin, counterscarp gallery and countermines opposite the north ravelin salient.
(*3*) Section of north ravelin.
(*4*) Section of bridge and gate tunnel.
(*5*) Elevation of gate from ditch.
(*6*) Elevation of cavalier.
(*7*) Elevation of north ravelin.
(*8*) Section of rainwater tanks.
4-2A is a modern redrawing of several portions of sections Nos. 1, 2, and 4 of the above. Despite the title, 4-2B is a modern redrawing of sections Nos. 1-4 of the above.

Source: 4-2, 4-2A and 4-2B: Public Archives of Canada, National Map Collection. The original source for 4-2 is unknown.

Code: 04-1854-6-1.
Title: "Fort George / Halifax N.S. / A Sketch of the covering of Casemates / with Asphalte . . ."
Signature and date: R.M.P., 12 June 1854.
Scale: 1 in. to 15 ft.
Comments: Plan, two sections and notes. This small plan is the best source for information about the method of waterproofing finally adopted for the casemate dos d'anes, although this scheme was subsequently altered in the light of continuing experience. The plan shows the top of the dos d'anes. The two sections show the interior of the casemate, down pipes, chimney, etc.
Source: Public Archives of Canada (MG12, WO55, Vol. 887, fol. 498).

Code: 27-1854-8-1.
Title: "Citadel, Halifax N.S. / Plan & Elevation of proposed / Ball Court."
"To accompany the B.A.E. 1855-6 / Item 27."
Signature and date: No signature. Dated 29 Aug. 1854 and 30 Aug. 1854.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections, reference notes, detail of timber.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1854-9-1.
Title: Plan of ground floor "shewing the proposed alteration in the position of / the Stoves in Soldier's Rooms . . ."
Signature and date: Stotherd, 14 Sept. 1854.
Scale: 1 in. to 20 ft.
Comments: Plan of ground floor and notes. The title is self-explanatory. The proposal this illustrates was accepted.
Source: Public Archives of Canada (MG12, WO55, Vol. 887, fol. 435A).

Code: 03-1855-6-1.
Title: "Halifax – Nova Scotia. / Citadel, Fort George. / Plan and section shewing the Proposed / Roof for Covering over the Cavalier . . ."
Signature and date: Stotherd, 21 June 1855.
Scale: 1 in. to 10 ft.
Comments: Plan, section and reference notes. Very detailed, and probably the best plan of the cavalier roof.
Source: Public Archives of Nova Scotia.

Code: 04-1856-1-1.
Title: "Plan and sections showing the work described / in improving the Soil Pits at the / Soldier's Privies / at the / Citadel . . ."
Signature and date: Stotherd, 1 Jan. 1856.
Scale: 1 in. to 10 ft. and 1 in. to 4 ft.
Comments: Plan and five sections. The privies were in casemates 6 and 7A, and this is the only plan extant of either of them. It also shows the sally port between the two casemates, as well as cesspools, drains, etc.
Source: Public Archives of Canada (MG12, WO55, Vol. 887, fol. 659).

Code: 01-1856-5-1.
Title: "Plan / of / Fort George or the Citadel / Halifax, N.S. / To accompany the Report of the Commissioners on the Defences / Dated 5th May / 1856."
Signature and date: Stotherd, 5 May 1856.
Scale: Not given.
Comments: Ground plan of the Citadel.
Source: Public Archives of Canada (MG12, WO55, Vol. 1558, part 7, fol. 32).

Code: 06-1858-8-1.
Title: "Halifax / Projection [?] shewing the mode of arranging the lightning conductors to the existing / Powder magazines / in accordance with Circular N° 260 / To accompany the Ordnance Annual Estimate 1859–60 Item 4."
Signature and date: Dawson, 2 Aug. 1858.
Scale: 1 in. to 20 ft.
Comments: Three perspective drawings, showing the following:
(*1*) The north magazine.
(*2*) The ammunition store (not in the Citadel).
(*3*) The naval magazine (not in the Citadel).
The method described here was altered slightly – the conductors were not used on the porches – but otherwise this was the way in which the lightning apparatus was installed.
Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 627).

Code: 01-1858-8-2.

Title: "Halifax N.S. / Plan & section shewing in yellow the proposed cunette / To accompany the Ordnance Annual Estimate 1859–60 Item 3."

Signature and date: Lieutenant Dawson, 7 July 1858.

Scale: 1 in. to ca. 90 ft.

Comments: General plan showing connecting drains and cess pits, with reference notes. It is not certain whether the cunette was actually built; it probably was.

Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 137).

Code: 01-1858-8-3.

Title: "Fort George / shewing position of tanks & drains for supplying them."

Signature and date: Gordon, 11 Aug. 1858.

Scale: 1 in. to ca. 75 ft.

Comments: Ground plan. The earliest surviving plan of the water system as finally constructed.

Source: Public Archives of Canada, National Map Collection, H4/250.

Code: 27-1858-13-1.

Title: "Halifax Nova Scotia / O A E 59.60 Item 2."

Signature and date: None.

Scale: 1 in. to 2 ft.

Comments: Plan, section and two elevations of the sally port doors.

Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 136).

Code: 01-1859-4-1.

Title: "Perambulation Plan N° 1 / Halifax / Nova Scotia / Plan shewing W. D. Property."

Signature and date: Locock, 2 April 1859.

Scale: 1 in. to 200 ft.

Comments: Property plan of Citadel and vicinity.

Source: Public Archives of Canada, National Map Collection.

Code: 04-1859-11-1.

Title: "Halifax N.S. / Plan and sections of Proposed / Drainage of the Ramp in the Citadel in order to / the Prevention of Dampness in the Artillery Store / Adjoining." "Fortifications A.E. 1860–61 / Item 3."

Signature and date: Signature illegible. Dated Nov. 1859; day of month illegible.

Scale: 1 in. to 10 ft.

Comments: Plan, section and sectional elevation. This proposal was never adopted.

Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 172).

Code: 01-1860-9-1.

Title: "Plan / of the / Citadel Glacis / Halifax N.S. / Reduced from the survey by Lieutenant Locock R.E."

Signature and date: Dirom, 18(?) Sept. 1860.

Scale: 1 in. to 150 ft.

Comments: The only surviving contour plan of the Citadel glacis. Unfortunately it is so faded as to be virtually useless. In any event, the glacis was never entirely completed as planned.

Source: Public Archives of Canada, National Map Collection; original source unknown.

Code: 01-1860-10-1.

Title: "Citadel / Halifax N S. / Sketch shewing at *a, a,* the relative positions of the two proposed splinter proof magazines scale 200' – 1"."

Signature and date: Nelson, 24 Oct. 1860 and Dirom, 5 Oct. 1860.

Scale: 1 in. to 200 ft.

Comments: Small general location plan.

Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 240).

Code: 07-1861-11-1.

Title: "Halifax Nova Scotia / Citadel / plan and sections shewing the mode / proposed for staunching leakage / and ventilating / the shifting rooms of the / North and South / magazines / to accompany the Civil Buildings An^{1} Estimate 1862–3 / Item 6."

Signature and date: Westmacott, 18 Nov. 1861.

Scale: 1 in. to 10 ft.

Comments: Plan, two sections and reference notes. It is uncertain whether this scheme was ever adopted; it probably was. The method proposed provides an interesting contrast to the earlier staunching schemes.

Source: Public Archives of Canada (RG8, C series, Vol. 1653A, p. 706).

Code: 06-1862-7-1.

Title: "Halifax, Nova Scotia / Citadel / Plan sections and Elevation / of proposed / new splinter proof magazine in traverses / 54 [illegible]."

Signature and date: Drawn by Corporal Scott, RE, 7 July 1862; initialled Sp[encer] W[estmacott] 7 July 1862.

Scale: 1 in. to 5 ft.

Comments: Plan and three sections.

Source: Public Archives of Canada, National Map Collection (H4/250).

Code: 01-1862-13-1.

Title: "Fort George or the Citadel / Halifax, N.S."

Signature and date: "Lithographed at the Topographical Department of the War Office," no date.

Scale: 1 in. to 40 ft.

Comments: Surface plan of ramparts. Does not show the west ravelin, but details the embrasures in the other two. Shows only the salient gun positions in the body of the work.

Source: Public Archives of Canada, National Map Collection (A/202, 1862).

Code: 20-1868-11-1.

Title: "Halifax N.S. / Citadel / Plan Section & Elevation shewing proposed Side Arm Shed." "To accompany Item – F.A.E. 69/70."

Signature and date: Burnaby, 20 Nov. 1868.

Scale: 1 in. to 4 ft.

Comments: Plan, elevation, section. Marginal notation indicates that the building was erected in 1870–71.

Source: Public Archives of Canada, National Map Collection.

Code: 01-1871-4-1.

Title: "Halifax N.S. / Plan of / Citadel . . ." (remainder of legend obscured).

Signature and date: George, April 1871.

Scale: 1 in. to ca. 125 ft.

Comments: An armament plan showing the saluting battery. Very faded.

Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 01-1874-1-1 (1-1A).

Title: 1-1: "Halifax N.S. / General Plan / of the / Citadel / Shewing the position of Guns for next / Armament." 1-1A: "Gun positions / the Citadel or Fort George / Halifax N.S."

Signature and date: 1-1: G. Bastide, Lieutenant, RE, dated 28 Jan. 1874. 1-1A: F.M.F., 25 July 1950.

Scale: 1-1: illegible on Public Archives copy; 1-1A, 1 in. to 40 ft.

Comments: 1-1 is a ramparts plan showing traverses, gun positions, platforms, embrasures. 1-1A is a modern retracing.

Source: 1-1 and 1-1A: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 25-1875-9-1.

Title: "Citadel / Sketch of Proposed / new / Armourers Shop." ("B.A.E. Item 19, 1876–7.")

Signature and date: No signature. Dated 10 Sept. 1875. Also signed F. W. Waters, Lieutenant RE, 17 Sept. 1875.

Scale: 1 in. to 4-1/2 ft.

Comments: Plan, elevation, section, site plan. The armourer's shop was a wooden lean-to attached to the rear of the cavalier.

Source: Public Archives of Canada, National Map Collection, (H4/250).

Code: 03-1875-10-1.

Title: "Halifax, N.S. / Citadel / Proposed conversion of the top of the cavalier into a barrack / to contain 90 men."

Signature and date: Watkins, 4 Oct. 1875.

Scale: 1 in. to 5 ft. and 1 in. to 2 ft.

Comments: Two sections, six details. Concentrates on rafters, plates, joists, staircases, windows, etc. The addition of the new barrack storey greatly altered the shape of the cavalier (*see* below).

Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 03-1875-10-2.

Title: "Halifax, N.S. / Citadel / Conversion of the top of the cavalier into a barrack Room / to contain 25 men." "Item 14, Part 2, B.A.E. 1876–7."

Signature and date: Watkins, 4 Oct. 1877.

Scale: 1 in. to 10 ft.

Comments: Two sections, two elevations.

Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 11-1875-10-3 (10-3A).

Title: 10-3: "Halifax, N.S. / Citadel / Rebuilding Retaining Walls – East Salient – Right & Left faces." "Item 2, F A E 1876–7 / sent in Duplicate." 10-3A: "Halifax, N.S. / Citadel / East Salient – Right & Left faces / sketch of Proposed method of rebuilding Retaining wall."

Signature and date: 10-3: Watkins, 18 Oct. 1875; 10-3A: Watkins, retraced by RE sergeant, 30 Oct. 1875.
Scale: (Both) 1 in. to 7-1/2 ft.
Comments: Two plans, two elevations, two sections. Shows the retaining wall of both sides of the salient. One of the sections shows the state of the wall before reconstruction.
Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 03-1877-7-1.
Title: "Halifax, N.S. / Plans of / Cavalier in Citadel."
Signature and date: Drawn by RE sergeant, 25 July 1877.
Scale: 1 in. to 200 ft.
Comments: Three floor plans, three sections, one sketch, site plan and reference notes. This is a record plan showing the cavalier as reconstructed. *Compare* plans 03-1875-10-1 and 10-2.
Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 06-1882-8-1.
Title: "Halifax, N.S. / Citadel / Main Magazines / Plans, sections and Photographs."
Signature and date: Ellsdale, 18 Aug. 1882.
Scale: 1 in. to 15 ft.; 1 in. to 10 ft.
Comments: Two plans (one of each magazine), longitudinal section of south magazine, transverse section of north magazine, site plan, two photographs and reference notes. This is a record plan showing the buildings as they stood in 1882. The plans show the arrangement of the powd racks in the magazine, the drainage system in the area, and the shifting rooms.
Source: Public Archives of Nova Scotia.

Code: 07-1882-8-2.
Title: "Halifax, N.S. / Citadel / main magazines / Plans sections and Photographs."
Signature and date: Ellsdale, 18 Aug. 1882.
Scale: Original scale is 1 in. to 15 ft. and 1 in. to 10 ft., but this is reduced-size photocopy.
Comments: A second copy of plan 06-1882-8-1 (*see* preceding) filed under this heading because it supplies a plan and section of the shifting rooms.
Source: Public Archives of Nova Scotia.

Code: 01-1886-1-1
Title: "Halifax, N.S. / W.D. Property."
Signature and date: Cunningham, 8 Jan. 1886.
Scale: 1 in. to 100 ft.
Comments: Property plan of the Citadel and vicinity.
Source: Public Archives of Canada, National Map Collection.

Code: 12-1891-2-1.
Title: "Citadel / Halifax, N.S. / Working Drawing / of Tank."
Signature and date: Sapper Sutherland, Feb. 1891.
Scale: 1 in. to 10 ft.
Comments: Plan, two sections. The best plan of the 66,000 gallon tank.
Source: Public Archives of Nova Scotia.

Code: 01-1891-10-1.
Title: "Halifax, N.S. / The Citadel or Fort George. / Ground Plan."
Signature and date: Lieutenant Colonel Hill, 19 Oct. 1891.
Scale: 1 in. to 10 ft.
Comments: Ground plan with inserts of the redan basement, the upper floors of the cavalier and the signal establishment. This is the first version of Colonel Hill's plan. It shows the casemate appropriation.
Source: Public Archives of Canada, National Map Collection, (H4/250).

Code: 01-1891-11-1.
Title: "Halifax, N.S. / The Citadel or Fort George / Block Plan."
Signature and date: Hill, 21 Nov. 1891.
Scale: 1 in. to 10 ft.
Comments: Plan, site plan, tables, and reference notes. This is the second version of Hill's plan (*see* preceding). It details casemate appropriation and the water and drainage system. The plan also shows the new barracks (the "Brick Block") which, at the time the plan was drawn, was not yet built. The two tables detail the water tanks' capacities and accommodation.
Source: Public Archives of Canada, National Map Collection. Original source unknown.

Code: 28-1897-3-1.
Title: "Halifax, N.S. / Citadel Laboratory & Flag Staves / Plan of Lightning Conductors."
Signature and date: Jones, 25 March 1897.
Scale: 1 in. to 15 ft. and 1 in. to 40 ft.
Comments: Site plan, plan and section of laboratory, plan of south end of fort, and reference notes.
Source: Public Archives of Canada, National Map Collection.

Code: 27-1898-4-1.
Title: "Halifax, N.S. Citadel. Cavalier Barracks. B.A.E. 1898–9 Item 13 / Proposed enlargement of windows & renewal of roof covering."
Signature and date: CRE, 29 April 1898.
Scale: 1/4 in. to 1 ft. and 1 in. to 40 ft.
Comments: Site plan, three plans, section and two elevations. The plan details proposed alterations to the cavalier windows.
Source: Public Archives of Canada, National Map Collection.

Code: 17-1899-5-1.
Title: "Halifax, N.S. / Proposed barrack for 105 men in Citadel / Plan of site shewing Drains, Levels &c."
Signature and date: Various signatures. Dated 1 May 1899.
Scale: 1/10 in. to 1 ft.
Comments: Site plan showing existing and proposed drains.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1900-9-1
Title: "Halifax, N.S. Citadel. / Proposed Canteen on site of North Magazine / Site Plan Etc. Etc."
Signature and date: Wilkinson, 20 Sept. 1900.
Scale: 1 in. to 10 ft.
Comments: Plan, section and site plan of magazine before alteration.
Source: Public Archives of Canada, National Map Collection.
Code: 21-1900-9-3.
Title: "Halifax, N.S. Citadel. / Proposed Canteen on site of North Magazine."
Signature and date: CRE, 20 Sept. 1900.
Scale: 1/8 in. to 1 ft.
Comments: Two plans, four sections, and four details. Shows room allocation, chimneys, rafters, etc.
Source: Public Archives of Canada, National Map Collection.
Code: 21-1900-9-4.
Title: "Halifax, N.S. Citadel. / Proposed Canteen on site of North Magazine."
Signature and date: Wilkinson, 20 Sept. 1900.
Scale: 1/8 in. to 1 ft.
Comments: Four elevations, roof plan and partial section of wall.
Source: Public Archives of Canada, National Map Collection.

Code: 17-1901-5-1.
Title: "Halifax, N.S. Citadel. / Record Plans of Barracks for 105 men."
Signature and date: CRE [1 May] 1901.
Scale: 1 in. to 8 ft.
Comments: Five plans of the "Brick Block." The building has since been demolished.
Source: Public Archives of Canada, National Map Collection.
Code: 17-1901-5-2.
Title: "Halifax, N.S. Citadel / Record Plans of Barracks for 105 men."
Signature and date: Lissel, May 1901.
Scale: 1 in. to 8 ft.
Comments: Five sections, three elevations (*see* preceding).
Source: Public Archives of Canada, National Map Collection.

Code: 23-1902-2-1.
Title: "Halifax, N.S. / Citadel / New Gun Shed."
Signature and date: Lieutenant Colonel RE (?), 13 Feb. 1902.
Scale: 1/4 in. to 1 ft. and 1/8 in. to 1 ft.
Comments: Plan, two elevations, section, and detail of roof.
Source: Public Archives of Canada, National Map Collection.
Code: 23-1902-2-2.
Title: "Halifax, N.S. Citadel / Record Plan of [New] Gun Shed for 6 15 pr. B. L. Guns & Limbers."
Signature and date: Lissel, 11 Feb. 1902.
Scale: 1 in. to 4 ft. and 1 in. to 8 ft.
Comments: Plan, two elevations, section and detail of roof truss. Essentially similar to plan 23-1902-2-1 with a few variations.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1902-8-1.
Title: "Halifax, N.S. /. Citadel. /. Record. Plans. of. Canteen."
Signature and date: No signature. Dated 26 Aug. 1902.
Scale: 1 in. to 8 ft. 1 1/2500.
Comments: Site plan, roof plan and four elevations. A record plan of the canteen showing the building as constructed.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1902-8-3 (8-3A).
Title: "Halifax, N.S. / Citadel. / Record Plans of Canteen."
Signature and date: Lissel, 25 Aug. 1902.
Scale: 1 in. to 8 ft.
Comments: Two plans, four sections and notes. This plan details the building as constructed. The notes detail dates, costs and materials. 8-3A is slightly different.
Source: Public Archives of Canada, National Map Collection.

Code: 23-1904-13-1.
Title: "Halifax N.S. Citadel. / Record Plan of Gun Shed. for 6 15 PR. B. L. Guns and Limbers."
Signature and date: No signature. Dated 1904.
Scale: 1 in. to 4 ft. and 1 in. to 8 ft.
Comments: Site plan, plan, two elevations, section and notes. The plan shows the building as constructed (*compare* plan 23-1902-2-1). The notes detail costs, dates and building materials. The building has since been demolished.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1907-13-1.
Title: "Halifax, N.S. / The Citadel or Fort George / Block Plan."
Signature and date: Ward, 1907.
Scale: 1 in. to 40 ft.
Comments: Block plan showing position and allocation of buildings, casemate numbering, etc. (*see* plan 01-1908-8-1).
Source: Public Archives of Canada, National Map Collection.

Code: 01-1908-4-1.
Title: "Halifax, N.S. / The Citadel or Fort George / Block Plan."
Signature and date: Dalton, April 1908.
Scale: 1 in. to 40 ft.
Comments: Site plan, block plan and reference notes. Shows casemate usage (*see* plan 01-1908-8-1).
Source: Public Archives of Canada, National Map Collection.

Code: 01-1908-8-1.
Title: "Halifax, N.S. / The Citadel or Fort George. / Ground Plan."
Signature and date: James, 18 Aug. 1908.
Scale: 1 in. to 40 ft.
Comments: A very detailed ground plan with inserts showing the following:
(*1*) The redan basement.
(*2*) The upper storeys of the cavalier.
(*3*) The upper storey of the canteen.
(*4*) The upper storeys of the brick block.
The plan shows room layout and allocation. Much more detailed than either of the preceding.
Source: Public Archives of Canada, National Map Collection.

Code: 04-1910-7-1.
Title: "Halifax, N.S. / Proposed Alterations / to / W.O.'s Quarter's [*sic*] / Citadel."
Signature and date: Parker, 19 July 1910.
Scale: 1 in. to 8 ft.
Comments: Two plans, two sections and two elevations. It is not entirely clear whether the casemates in question were in the redan or the cavalier, but the former seems most likely.
Source: Public Archives of Canada, National Map Collection.

Code: 22-1911-8-1.
Title: "Halifax, N.S. / The Citadel / Proposed Cookhouse & Dining Rooms."
Signature and date: Marshall, 15 Aug. 1911.
Scale: 1 in. to 8 ft.
Comments: Plan, three elevations.
Source: Public Archives of Canada, National Map Collection.

Code: 18-1911-8-2.
Title: "Halifax, N.S. / Citadel / Proposed Recreation Establishment."
Signature and date: No signature. Dated 8 Sept. 1911 and 29 Sept. 1911.
Scale: 1 in. to 16 ft.
Comments: Elevation only.
Source: Public Archives of Canada, National Map Collection.

Code: 18-1911-9-1.
Title: "Halifax, N.S. / The Citadel / Proposed Recreation Establishment."
Signature and date: A.M., Corporal, R.C.E., 12 Sept. 1911, and Captain RCE, 29 Sept. 1911.
Scale: 1 in. to 16 ft.
Comments: Section showing ditch.
Source: Public Archives of Canada, National Map Collection.

Code: 18-1911-9-3.
Title: "Halifax, N.S. / Citadel Ramparts / Site for / Proposed Recreation Establishment."
Signature and date: No signature. Dated 29 Sept. 1911.
Scale: 1 in. to 8 ft.
Comments: Plan and section of southwest demi-bastion.
Source: Public Archives of Canada, National Map Collection.

Code: 04-1911-9-4.
Title: "Halifax N.S. / Citadel Casemates Blocks E & F / Proposed conversion of Recreation Establishment into Serg^{ts} Mess."
Signature and date: Captain, RCE, 29 Sept. 1911.
Scale: 1 in. to 8 ft.
Comments: Two plans and two sections of casemates 45–8.
Source: Public Archives of Canada, National Map Collection.

Code: 26-1912-13-1.
Title: "Halifax, N.S. / Citadel / 4.7 gun mounted for Drill Purposes."
Signature and date: RE 1912.
Scale: 3/8 in. to 1 ft.
Comments: Plan, section and elevation.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1913-4-1.
Title: "Ground Floor Plan / Citadel Canteen."
Signature and date: Traced by D. F. Saxton, 9 April 1913.
Scale: 1 in. to 8 ft.
Comments: Plan showing room use.
Source: Public Archives of Canada, National Map Collection.

Code: 23-1913-5-1.
Title: "Halifax, N.S. / Citadel / Gun Shed."
Signature and date: Knight, 30 May 1913.
Scale: 1 in. to 8 ft. and 1 in. to 4 ft.
Comments: Three plans, three elevations, two sections. Record plan.
Source: Public Archives of Canada, National Map Collection.

Code: 04-1913-6-1.
Title: "Halifax, N.S. / Citadel, Sgt's mess / Proposed installation of W.C. / Urinals & Lavatory Basin."
Signature and date: Signature illegible. Dated 27 June 1913.
Scale: 1 in. to 10 ft.
Comments: Plan of casemates 45–8 and section of No. 47.
Source: Public Archives of Canada, National Map Collection.

Code: 17-1914-7-1.
Title: "Halifax, N.S. / Citadel / New Barracks." ("Record Plan.")
Signature and date: Young, 21 July 1914.
Scale: 1 in to 8 ft.
Comments: Five plans.
Source: Public Archives of Canada, National Map Collection.

Code: 16-1914-10-1.
Title: "Record Plan / Halifax, N.S. / Citadel / Signaling Station."
Signature and date: Hechler, 23 Oct. 1914.
Scale: 1 in. to 8 ft. and 1 in to 4 ft.
Comments: Three plans, four elevations, three sections.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1915-2-1.
Title: "Halifax, N.S. / Citadel Glacis Barracks, Pavilion / Hospital, RA Park, South Barracks & Belle Vue / Perambulation plan."
Signature and date: Young, 5 Feb. 1915.
Scale: 1/152064 (12.672 in. to 1 mile).
Comments: Plan showing military property.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1916-2-1.
Title: "Site Plan."
Signature and date: No signature Dated 26 Feb. 1916.
Scale: 1/2500.
Comments: Site plan showing glacis contour and building use. Shows prisoner of war enclosure within the Citadel.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1916-3-1.
Title: "Halifax, N.S. / Citadel, Glacis Barracks, Pavilion / Hospital, R. A. Park, South Barracks & Bellevue."
Signature and date: Young, 22 March 1916.
Scale: 1 in. to 208.33 ft.
Comments: Property plan.
Source: Public Archives of Canada, National Map Collection.

Code: 16-1916-10-1.
Title: "Proposed Accommodation / For Signal Station Citadel."
Signature and date: Major, RCE, 25 Oct. 1916.
Scale: 1/8 in. to 1 ft., 1/4 in. to 1 ft. and 1/2 in. to 1 ft.
Comments: Two plans, two sections, three elevations.
Source: Public Archives of Canada, National Map Collection.

Code: 14-1920-5-1.
Title: None.
Signature and date: Hart, 22 May 1920.
Scale: Varies..
Comments: Plans, elevations and sections of proposals to deal with a collapsed escarp wall in the south-east salient.
Source: Public Archives of Canada, National Map Collection.

Code: 04-1921-3-1.
Title: "Halifax, N.S. / Citadel / Casemates / Sergeants Mess."
Signature and date: R. V. Hart, 19 March 1921.
Scale: 1 in to 8 ft.
Comments: Plan of casemates 26–9.
Source: Public Archives of Canada, National Map Collection.
Code: 21-1921-3-2.
Title: "Halifax, N.S. / Citadel / (Canteen Bldg.) / Recreation Room."
Signature and date: Hart, 22 March 1921.
Scale: 1 in to 8 ft.
Comments: Floor plan showing room use.
Source: Public Archives of Canada, National Map Collection.
Code: 03-1921-3-3.
Title: "Halifax, N.S. / Citadel / (Cavalier) / Grocery Bar."
Signature and date: Hart, 21 March 1921.
Scale: 1 in to 8 ft.
Comments: Plan of ground floor of one of the cavalier casemates.
Source: Public Archives of Canada, National Map Collection.

Code: 19-1921-9-1.
Title: "Department of Militia & Defence. / M.D. N° 6 / office of S.E.O. / Halifax, N.S. Citadel / Miniature Rifle Range / Sketch."
Signature and date: Hart, 30 Sept. 1921.
Scale: 1 in. to 20 ft.
Comments: See title.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1922-1-1.
Title: "Department of Militia and Defence – M D N° 6 / Office of S.E.O. / Halifax, N.S. / The Citadel or Fort George / Ground Plan."
Signature and date: M. (?) Benoit, Lieutenant Colonel RCE, Jan. 1922.
Scale: 1 in. to 40 ft.
Comments: Very detailed ground plan showing building use, with inserts of
(1) The upper storeys of the brick block.
(2) The signal establishment.
(3) The upper storey of the south ravelin guardhouse.
(4) The redan ramparts.
(5) The redan basement.
(6) The upper storeys of the cavalier.
(7) The upper storey of the canteen.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1923-2-1.
Title: None. Notation in one corner: "Enlarged from Ordnance Sheet, 1/2500."
Signature and date: R. V. Hunt, 10 Feb. 1923.
Scale: 1 in. to 60 ft.
Comments: Contour plan of the glacis.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1924-10-1.
Title: "Citadel / Cavalier Barracks / Department of National Defence / M.O., N° 6 / Office of D.E.O. / Halifax, N.S. / Proposed New Roof / to Replace Roof destroyed by Storm October 9th 1924."
Signature and date: No signature. Dated 17 Oct. 1929.
Scale: 1 in. to 10 ft. and 1 in. to 15 ft..
Comments: Two plans, three sections.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1925-5-1.
Title: "Cavalier / Citadel / Attic Plan showing proposed Accommodation."
Signature and date: Benoit, 29 June 1925.
Scale: 1/8 in. to 1 ft.
Comments: Cutaway plan of roof.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1925-6-1.
Title: "Citadel / Cavalier Barracks."
Signature and date: Benoit, 29 June 1925.
Scale: 1 in. to 15 ft. and 1 in. to 10 ft.
Comments: Three plans, two sections, showing room use.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1925-7-1.
Title: "Halifax, N.S. / Citadel / R A Park & South Bks."
Signature and date: H. (?) J. Knight, 3 July 1925.
Scale: 1/2500.
Comments: Plan showing underground cable.
Source: Public Archives of Canada, National Map Collection.

Code: 28-1928-1-1.
Title: "Citadel / Property Plan."
Signature and date: Lt. Col., RCE, 5 Jan. 1928.
Scale: 1 in. to 100 ft.
Comments: Property plan showing site but not works.
Source: Public Archives of Canada, National Map Collection.

Code: 17-1930-3-1.
Title: "R.C.A. New Barracks / & / Recreations Estaᵒ / Citadel."
Signature and date: Russell, 10 March 1930.
Scale: 1 in. to 8 ft.
Comments: Four plans of brick block.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1933-6-1.
Title: "Halifax, N.S. / Citadel / Unemployment Relief Project / Plan to Accompany Progress Report. . . ."
Signature and date: Lieutenant Colonel, RCE, 30 June 1933.
Scale: 1 in. to 60 ft.
Comments: General plan of Citadel.
Source: Public Archives of Canada, National Map Collection.

Code: 17-1938-10-1.
Title: "Citadel / Brick Block / Halifax, N.S. / Proposed Accommodation for RCAF."
Signature and date: Lieutenant Colonel, RCE, 4 Oct. 1938.
Scale: 1/8 in. to 1 ft.
Comments: Three floor plans.
Source: Public Archives of Canada, National Map Collection.

Code: 28-1940-1-1.
Title: "Foundation Plan of Mess / 300 men / Citidal [*sic*] Hill."
Signature and date: No signature. Dated 5 Jan. 1940.
Scale: 1/8 in. to 1 ft.
Comments: Shows sills, joists and posts.
Source: Public Archives of Canada, National Map Collection.

Code: 28-1940-1-2.
Title: "Officers Living Quarters / Citadel – Hill – Halifax."
Signature and date: No signature. Dated 11 Jan. 1940.
Scale: 1/8 in. to 1 ft.
Comments: Three plans, section and elevation.
Source: Public Archives of Canada, National Map Collection.

Code: 28-1942-5-1.
Title: "Mess 20 NCO's & 70 O.R.S. / AC Signals Citadel Hill / Halifax, N.S."
Signature and date: No signature. Dated 15 May 1942.
Scale: 1/8 in. to 1 ft.
Comments: Plan and elevation.
Source: Public Archives of Canada, National Map Collection.

Code: 08-1943-7-1.
Title: "Lavatories G.O.R. / Citadel Hill."
Signature and date: No signature. Dated 12 July 1943.
Scale: 1/4 in. to 1 ft.
Comments: Plan of lavatories in south magazine area.
Source: Public Archives of Canada, National Map Collection.

Code: 06-1943-7-2.
Title: "G.O.R. in 'B' Magazine / Citadel Halifax N.S."
Signature and date: No signature. Dated 17 July 1943.
Scale: 1 in. to 4 ft..

Comments: Plan and two sections of magazine and shifting room.
Source: Public Archives of Canada, National Map Collection.

Code: 10-1943-8-1.
Title: "Citadel / Moat Profile."
Signature and date: Wallace, 8 Aug. 1943.
Scale: 1 in. to 80 ft. and 1 in. to 20 ft.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1944-12-1.
Title: "Plumbing, Heating & / Electrical Layout. / Canteen Building / Citadel."
Signature and date: No signature. Dated 23 Dec. 1944.
Scale: 1/8 in. to 1 ft.
Comments: Three plans.
Source: Public Archives of Canada, National Map Collection.

Code: 21-1945-7-1.
Title: "Revisions & Detail / Officer's & Sgt's Messes / Citadel / Halifax N.S."
Signature and date: No signature. Dated 7 July 1945.
Scale: Varies.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 27-1945-11-1.
Title: "Storm Sash / Citadel Hill."
Signature and date: No signature. Dated 19 Nov. 1945.
Scale: 1 in. to 1 ft.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1945-12-1.
Title: "Cavalier Block / Citadel Hill / Halifax N.S."
Signature and date: Queen, 20 Dec. 1945.
Scale: 3/32 in. to 1 ft.
Comments: Plan and front elevation.
Source: Public Archives of Canada, National Map Collection.

Code: 03-1945-12-2.
Title: "Cavalier Block / Citadel Hill / Halifax N.S."
Signature and date: Queen, 14 Dec. 1945.
Scale: 3/32 in. to 1 ft.
Comments: Three elevations.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1950-7-1 (7-1A).
Title: 7–1 "The Citadel / or / Fort George." 7-1A: "Code Plan for Restoration /of / Halifax Citadel."
Signature and date: No signatures. 7-1 is dated 21 July; 7-1A is dated Sept. 1951.
Scale: 1 in. to 40 ft.
Comments: 7-1 is a ground plan. 7-1A is a ground plan with notes and references. The plan was drawn for submission to the Massey Commission.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1951-4-1.
Title: "Citadel / Halifax N.S."
Signature and date: Traced by R.O., 30 April 1951.
Scale: 1 in. to 40 ft.
Comments: None.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1951-9-1.
Title: "Halifax Citadel / or / Fort George."
Signature and date: No signature. Dated Sept. 1951.
Scale: Varies.
Comments: Ground plan.
Source: Public Archives of Canada, National Map Collection.

Code: 01-1955-3-1 (3-1A).
Title: 3-1: "Compiled Plan of / Halifax Citadel National Historic Site / City of Halifax / Province of Nova Scotia . . ." 3-1A: "Halifax Citadel National / Historic Site, Halifax N.S."
Signature and date: No signature. There are various dates, but this version of the plan was drawn 17 April 1955.
Scale: 1 in. to 80 ft.
Comments: Site plan showing property boundary but *not* the Citadel itself.
Source: Public Archives of Canada, National Map Collection.

Code: 26-1962-1-1.
Title: "Record Plan / Halifax Citadel / Nat'l Historic Sites / East Redan Rampart / Cross section of Rampart."

Signature and date: No signature. Dated January 1962.
Scale: Not given.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 26-1962-1-2.
Title: "Record Plan / Halifax Citadel / Nat'l Historic Site / East Redan Ramparts / Cross section of Rampart."
Signature and date: No signature. Dated January 1962.
Scale: Not given.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 26-1962-3-1.
Title: "Record Plans / Halifax Citadel / Nat'l Historic Site / East Redan Rampart / surface Plan".
Signature and date: Initialled A.L.R. Dated 9 March 1962.
Scale: 1/8 in. to 1 ft.
Comments: *See* title.
Source: Public Archives of Canada, National Map Collection.

Code: 01-0003-13-1.
Title: "Halifax, N.S. / Basement Plan of Fort George / shewing the Tanks and underground Drains."
Signature and date: None.
Scale: 1 in. to 60 ft.
Comments:
Source: Public Archives of Canada, National Map Collection.

Code: 12-0003-13-2
Title: "Halifax, N.S. / Citadel / Plan & Sections of Rain Water Tanks."
Signature and date: None.
Scale: 1 in. to ca. 8 ft.
Comments: Plan and five sections, ca. 1880.
Source: Public Archives of Canada, National Map Collection. (H4/250).

Code: 21-0004-13-1.
Title: "Citadel – Halifax N.S. / Canteen / Plan & Section of proposed Cellar."
Signature and date: Signature illegible. No date.
Scale: 1 in. to 10 ft.
Comments: Plan and section of a proposed cellar under an unidentified casemate. Never built.
Source: Public Archives of Canada, National Map Collection.

Code: 01-0004-13-2.
Title: "Halifax N.S. / Citadel, Glacis Barracks, Pavilion, Garrison Chapel, Hospital / R.A. Park, South Barracks & Bell Vue House / Perambulation Plan."
Signature and date: None.
Scale: "25.344 inches to a mile."
Comments: Property plan and reference notes, ca. 1900.
Source: Public Archives of Canada, National Map Collection.

Code: 01-0004-13-3.
Title: "Halifax, N.S. / the Citadel or Fort George / Water & Drainage Plan."
Signature and date: None.
Scale: 1 in. to 40 ft.
Comments: Ground plan showing drainage, ca. 1900.
Source: Public Archives of Canada, National Map Collection.

Code: 04-0005-13-1.
Title: "Halifax, N.S. / Citadel Guard Room / Heating System."
Signature and date: None. My dating of post-1906 is conjectural.
Scale: 1/4 in. to 1 ft.
Comments: Plan of two unidentified rooms, possibly casemates 49 and 50, ca. 1910.
Source: Public Archives of Canada, National Map Collection.

Code: 17-0005-13-2.
Title: "Halifax N.S. / Men's Block / Citadel / Ground Floor Plan."
Signature and date: None.
Scale: 1/8 in. to 1 ft.
Comments: Floor plan of the brick block, ca. 1910.
Source: Public Archives of Canada, National Map Collection.

Code: 16-0005-13-3.
Title: None.
Signature and date: None.
Scale: Not given.
Comments: Plan of signal station and time ball.
Source: Public Archives of Canada, National Map Collection.

Code: 17-0005-13-4.
Title: "New Block / Citadel."
Signature and date: None.
Scale: 1/2 in. to 1 ft.
Comments: Plan, section and elevation of lavatory.
Source: Public Archives of Canada, National Map Collection.

Code: 14-0005-13-5.
Title: "Detail of Struts"; "to be placed at various positions / around wall as shown in red / on attached blue print."
Signature and date: None.
Scale: 1 in. to 8 ft.
Comments: Plan and section of struts to hold up a collapsing escarp wall, ca. 1930.
Source: Public Archives of Canada, National Map Collection.

Code: 01-0005-13-6.
Title: "Halifax N.S. / Citadel, Common, R. A. Park, South Barracks, Etc."
Signature and date: None.
Scale: 1/2500.
Comments: Plan of Citadel and vicinity, ca. 1915.
Source: Public Archives of Canada, National Map Collection.

Code: 16-0005-13-7.
Title: "Signal Station / Citadel."
Signature and date: None.
Scale: Not given.
Comments: Three plans, four elevations, two sections.
Source: Public Archives of Canada, National Map Collection.

Code: 01-0005-13-8.
Title: "Citadel / Proposed Drain."
Signature and date: None.
Scale: 1 in. to 40 ft.
Comments: Plan of north end of the fort.
Source: Public Archives of Canada, National Map Collection.

Code: 23-0005-13-9.
Title: "Gun Shed / Citadel Hill / Halifax – Nova Scotia."
Signature and date: None.
Scale: Varies.
Comments: Plan, two elevations, sections and detail of roof truss.
Source: Public Archives of Canada National Map Collection.

Code: 01-0005-13-10.
Title: None.
Signature and date: None.
Scale: None.
Comments: General plan of the Citadel showing the building layout, ca. 1945. Not to scale.
Source: Public Archives of Canada, National Map Collection.

". . . we have nothing on Citadel Hill but a heap of ruins. . . ."

1 Canada. Public Archives (hereafter cited as PAC), MG12, WO55, Vol. 862, pp. 555-8, Arnold to Ellicombe, 16 Nov. 1824. In bastion fortification a perpendicular is an imaginary line which bisects the exterior length (i.e., the distance from salient to salient) of a side. It is used as an aid for determining, among other things, the lengths of the flanks. The length of the perpendicular is expressed as a fraction of the overall length of the side; perpendiculars of between 1/6 and 1/8 of the length are recommended in the textbooks. One of 1/12 was, therefore, a good deal shorter than the theoretical ideal. *See*, for example, John Muller, *A Treatise Containing the Elementary Part of Fortification, Regular and Irregular. With Remarks on the Construction of the most Celebrated Authors* (London: J. Nourse, 1746) (hereafter cited as Muller, *A Treatise Containing the Elementary Part of Fortification*), pp. 24–30.

2 For a more complete account of Straton's citadel, *see* Harry Piers, *The Evolution of the Halifax Fortress: 1749–1928*, rev. ed. (Halifax: Public Archives of Nova Scotia, 1847), and Raymond Baker, "The Early Citadels at Halifax, 1799–1818: A Preliminary Study," Manuscript on file National Historic Parks and Sites Branch, Ottawa.

3 National Historic Parks and Sites Branch files, Plans, Sections, etc. (hereafter cited as NHPS), plans 01-1800-1-1, 03-1800-1-3 and 28-1800-1-2.

4 PAC, MG12, WO55, Vol. 862, pp. 555–8, Arnold to Ellicombe, 16 Nov. 1824.

5 All information in this paragraph on the early citadels is from H. Piers, op. cit., and R. Baker, op. cit.

6 PAC, MG12, WO55, Vol. 864, pp. 524–7, Carmichael Smyth to Mann, 20 Sept. (?) 1827. General Morse had been chief engineer in America in the mid-1780s. He later became the first Inspector General of Fortifications (1802–11). He was also Smyth's father-in-law.

The Bureaucratic Process

1 For a full account of this period, *see* Kenneth Bourne, *Britain and the Balance of Power in British North America, 1815–1908* (Berkeley: Univ. of California Press, 1967), Ch. 1, passim.

2 *The Annual Register, or A View of the History, Politics and Literature for the Year* . . . (London: J. Dodsley, 1758–19–) (hereafter cited as *Annual Register*), 1792, 1815.

3 The actual figures for 1819 were:

Army	£8,517,044
Ordnance	1,407,807
Navy	8,517,044

In the following years, the figures for the army and navy continued to drop. The navy's revenue reached a low point of just over £4 million in 1836, and the army's stood at just over £6 million in the same year. The Ordnance figures remained remarkably constant at around £1.5 million. *See* ibid., 1819–36.

4 K. Bourne, op. cit., p. 23.

5 Richmond to Bathurst, 21 Aug. 1818, cited in John McKay Hitsman, *Safeguarding Canada* (Toronto: University of Toronto Press, 1968), pp. 117–8.

6 Arthur Wellesley, 1st Duke of Wellington, *Despatches, Correspondence, and Memoranda of Field Marshal Arthur, Duke of Wellington, K. G., edited by his son, the Duke of Wellington, K. G.* (London: J. Murray, 1867–80) (hereafter cited as Wellington, *Despatches*), Vol. 1, p. 39, No. 16, Wellington to Bathurst, 13 Jan. 1819.

7 K. Bourne, op. cit., p. 36.

8 Ibid., pp. 36–7.

9 Wellington, *Despatches*, Vol. 2, p. 444, No. 466, Draft of Instructions to Ordnance Commission in North America, 11 April 1825.

10 Ibid., Vol. 1, pp. 178–9, No. 92, Memorandum for the Earl of Liverpool recommending certain officers be made baronnets, 1821.

11 Ibid.

12 K. Bourne, op. cit., p. 38.

13 PAC, RG8, II, Vol. 6, part 1 (and elsewhere), "Copy of a Report to His Grace the Duke of Wellington . . . Relative to His Majesty's North American Provinces by a Commission of which M. General Sir James Carmichael Smyth was President . . . 1825" (hereafter cited as Smyth Report); *see also* J. J. Talman, "A Secret Military Document, 1825," *American Historical Review*, Vol. 38 (1932–33), pp. 295–300; and K. Bourne, op. cit., p. 39.

14 Wellington, *Despatches*, Vol. 2, p. 272, No. 499, Wellington to Bathurst, 6 Dec 1825.

15 Ibid., Vol. 3, p. 79, No. 514, Memorandum on the Parliamentary grants for the works of defence in British North America, 31 Jan. 1826.

16 Ibid., p. 80, Sir Henry Hardinge (Clerk of the Ordnance), Memorandum on the works in North America, 17 Feb. 1828.

17 Ibid., p. 373, No. 586, Wellington to Smyth, 10 Aug. 1826.

18 Ibid., pp. 81–3, Lt. Col. Ellicombe, "Memorandum relative to the money required for works of defence and water communication in the Canadas . . . ," 1 March 1828.

19 Ibid.

20 Great Britain. Parliament. Parliamentary Debates. *The Parliamentary Debates: Forming a Continuation of the Work Entitled "The Parliamentary History of England, from the Earliest Period to the Year 1803"* (London: T. Hansard, 1828) (hereafter cited as *Hansard*), n.s., Vol. 16, cols. 563–4, speech by Mr. Baring, 16 Feb. 1827.

21 Ibid., speech by Sir Henry Hardinge in reply to Baring.

22 Elizabeth Longford, *Wellington: Pillar of State* (London: Weidenfeld and Nicolson, 1972), p. 144.

23 Llewellyn Woodward, *The Age of Reform, 1815–1870*, 2d ed. (London: Oxford Univ. Press, 1962), p. 75.

24 Wellington, *Despatches*, Vol. 3, p. 79, No. 54, "Memorandum on the Parliamentary Grants for the Works of Defence in British North America," 31 Jan. 1826.

25 Great Britain. Parliament. Parliamentary Papers. *Parliamentary Papers: Reports from Committees* (London: H.M.S.O., 1828), Vol. 5, p. 403.

26 *See* "The Bureaucratic Process," n. 3, above.

27 *Hansard*, 3rd series, Vol. 22, p. 609, speech by Lord John Russell, 24 March 1834.

28 Great Britain. Parliament. House of Commons. Journals, *Journals of the House of Commons* (London: H.M.S.O., 1828), Vol. 83, pp. 499–500, 690, 3 July 1828.
29 Ibid., p. 514.
30 Ibid.
31 *Hansard*, n.s., Vol. 19, col. 1631, speech by Mr. Fitzgerald, 7 July 1828.
32 Ibid., col. 1630, speech by Mr. Maberly.
33 Ibid., cols. 1631–2, Henry Labouchere.
34 Ibid., cols. 1635–7, Mr. Huskisson.
35 Ibid., col. 1635, Lord Howick.
36 Ibid., cols. 1638–40, Robert Peel.
37 Ibid., col. 1640, record of division.
38 Charles Perry Stacey, *Canada and the British Army, 1846–1871: A Study in the Practice of Responsible Government* (London: Longmans, Green, 1936), p. 28.

Colonel Nicolls's Citadel

1 R. F. Edwards, comp. and ed., *Roll of Officers of the Corps of Royal Engineers from 1660 to 1898. Compiled from the Ms. Rolls of the late Captain T. W. J. Connolly, R. E. and brought up to date in the office of the R. E. Institute, Chatham* (Chatham: Royal Engineers Institute, 1898), p. 13.
2 PAC, MG12, WO55, Vol. 1558, part 5, "Observations on the Defence of Nova Scotia, 1827," p. 19. Ironically this was sent *after* Wellington had left the Ordnance. One wonders what Lord Anglesea thought about this flattery of his predecessor.
3 Beresford was an ensign at Annapolis Royal between 1786 and 1790. *See The Royal Military Calendar, or Army Service and Commission Book. Containing the Services and Progress of Promotion of the Generals, Lieutenant-Generals, Major-Generals, Colonels, Lieutenant-Colonels, and Majors of the Army, According to Seniority: With Details of the Principal Military Events of the Last Century*, ed. John Philippart, 3rd ed. (London: T. Egerton, 1820), Vol. 2, p. 236.
4 PAC, MG12, WO55, Vol. 867, p. 319, Nicolls to Mann, 30 March 1830.
5 Wellington, *Despatches*, Vol. 2, pp. 436–46, No. 466, Draft of instructions to Ordnance commission in North America, 11 April 1825.
6 PAC, RG8, II, Vol. 6, part 1, Smyth Report, pp. 120–1.
7 PAC, WO55, Vol. 864, pp. 524–7, Smyth to Mann, 20 Sept. (?) 1827.
8 Sir James Carmichael Smyth, *Precis of the Wars in Canada, from 1755 to the Treaty of Ghent in 1814. With Military and Political Reflections*, ed. Sir James Carmichael (London: Tinsley Brothers, 1862), p. 216.
9 PAC, MG12, WO55, Vol. 1558, part 5, "Observations on the Defence of Nova Scotia, 1827," p. 21.
10 Great Britain. Army. Corps of Royal Engineers, *Aide-Memoire to the Military Sciences. Framed from the Contributions of Officers of the Different Services* (London: J. Weale, 1846–52), Vol. 1, p. 60.
11 PAC, MG12, WO55, Vol. 1558, part 5, "Observations on the Defence of Nova Scotia, 1827," p. 19.
12 PAC, RG8, II, Vol. 6, part 1, Smyth Report, para. 48.
13 Ibid., Appendix C.
14 Ibid., Appendix E.
15 Ibid., Appendix B. The commission estimated £160,000 "for the proposed citadel, for finishing the tower on Mauger's Beach: as also for completing Fort Charlotte." It is therefore impossible to find out the exact amount estimated for each work.
16 Nova Scotia. Public Archives (hereafter cited as PANS), RE54, pp. 1–5, Nicolls to Mann, 20 Dec. 1825, p. 2.
17 Ibid., pp. 6–11, "General Estimate of the expense of Reconstructing in Masonry . . . Fort George on Citadel Hill," 20 Dec. 1825.
18 Ibid., p. 6.
19 *See* National Historic Parks and Sites Branch (hereafter cited as NHPS) plan 01-1825-12-1.
20 *See* ibid., sections of plan 02-1825-12-2.
21 PANS, RE54, p. 3, Citadel covering letter.
22 Ibid., pp. 3–4.
23 Ibid.
24 Ibid., p. 4.
25 *See* NHPS, plan 01-1832-2-1.
26 *See* ibid., plans 03-1825-12-3 and 03-1825-12-4.
27 *See* ibid., plan 03-1825-12-3.
28 *See* ibid., plan 01-1825-12-1.
29 PANS, RE54, p. 5, Citadel covering letter.
30 Ibid., pp. 10–1, Citadel estimate, 1825.
31 Ibid., pp. 6–7.
32 Ibid., p. 4, Citadel covering letter.
33 Ibid., p. 5.
34 H. Piers, op. cit., p. 34.
35 PANS, RE54, p. 2, Citadel covering letter.
36 *See* NHPS, plan 02-1825-12-2, sections.
37 Ibid.
38 For a brief description of Vauban's escarps, *see* J. Muller, *A Treatise Containing the Elementary Part of Fortifications*, pp. 50ff.

". . . I now think I made a little too free with the Climate. . . ."

1 *See* George Karl Raudzens, "The British Ordnance Department in Canada, 1815–1855," Ph.D. dissertation, Yale University, 1970; and Archibald Forbes, *A History of the Army Ordnance Services* (London: Medici Society, 1929).
2 PANS, RE24, No. 6, Ellicombe to Nicolls, 21 March 1826.
3 PAC, MG12, WO55, Vol. 864, pp. 524–7, Smyth to Mann, 20 Sept. (?) 1827.
4 PANS, RE54, pp. 14–5, Mann to Lord Downes, 21 June 1828. Note that Mann submitted the scheme directly to the Master General's aide, thereby circumventing Byham. This is one of the few instances of such a procedure, and probably reflects Mann's seniority and the fact that Byham, a relative newcomer (he had been appointed in 1827), had not yet established himself securely.
5 Ibid., p. 15, Master General's minute, 15 July 1828.
6 Ibid., p. 13, Byham to Mann, 16 July 1828, M/897.
7 Ibid., p. 16, General Bryce's minute, 26 July 1828. Bryce's minute is unusual in that such suggestions were customarily made before the project was submitted to the board for approval. This also was probably a reflection of Mann's power.
8 PANS, RE54, pp. 17–20, Nicolls to Mann, 7 Oct. 1828.
9 Ibid., pp. 20–3, Nicolls to Mann, 7 Oct. 1828.

10 PANS, RE24, No. 87, Cornelius Mann to Nicolls, 14 Nov. 1828.

11 PANS, RE24, No. 92, C. Mann to Nicolls, 3 Dec. 1828, enclosing Byham to Bryce, 26 Nov. 1828 (E/1124), and Bryce to Byham, 18 Nov. 1828, the Master General's minute of 24 Nov. 1828 and one other letter. This is a good example of the manner in which letters granting formal authority for a course of action were composed and transmitted (*see* introduction to this chapter). Hereafter only the specific letters quoted in the text will be cited.

12 PANS, RE8, pp. 87–8, Nicolls to Mann, 22 Nov. 1828.

13 PAC, MG12, WO55, Vol. 1558, p. 70, Specifications for building a stone wall on Citadel Hill, 12 Nov. 1828.

14 Ibid., Vol. 877, No. 11, contract, 16 Dec. 1828.

15 Ibid., No. 12, contract, 22 Dec. 1828.

16 PANS, RE29, pp. 21–2, Harris to Nicolls, 4 April 1829.

17 Ibid., p. 33, Nicolls to Northcott, 4 May 1829.

18 Ibid., pp. 33–4, Nicolls to Harris, 5 May 1829.

19 Ibid., p. 35.

20 Ibid., pp. 26–8, Harris to Nicolls, 6 May 1829 and 30 May 1829.

21 PAC, MG12, WO55, Vol. 866, p. 492, Nicolls to Mann, 24 June 1829.

22 PANS, RE8, pp. 97–8, Nicolls to Mann, 28 Aug. 1829.

23 PANS, RE29, pp. 37–8, Kelly to Damerum, 18 Aug. 1829.

24 Ibid., pp. 68–70, Nicolls to Roach, 21 Sept. 1829.

25 Ibid., p. 56, Damerum to Nicolls, 22 Sept. 1829.

26 Ibid., p. 55, Roach to Nicolls, 18 Sept. 1829.

27 Ibid., p. 94, Nicolls to Northcott, 10 Nov. 1829.

28 PANS, RE24, unpaginated, board order, 28 Jan. 1829, E/50.

29 PANS, RE55, unpaginated, Citadel accounts.

30 PANS, RE24, unpaginated, Bryce to Byham, 30 Jan. 1830; ibid., board order, 3 March 1830, E/113.

31 PAC, MG12, WO55, Vol. 1558, p. 71, "Specification for building a stone wall," 15 Oct. 1829.

32 Ibid., Vol. 887, p. 713, contract, 8 Dec. 1829.

33 Ibid., p. 714, contract, 19 Dec. 1828.

34 PANS, RE29, p. 107, Nicolls to Harris, 17 April 1830.

35 PANS, RE8, pp. 145–6, Nicolls to Bryce, 14 Aug. 1830.

36 PANS, RE55, unpaginated, Citadel accounts.

37 PAC, MG12, WO55, Vol. 887, p. 715, contract, 4 Nov. 1830.

38 Ibid., p. 713, contract, 8 Nov. 1830.

39 PANS, RE8, pp. 168–9, No. 25, Respective Officers to Byham, 11 Nov. 1830.

40 Ibid.

41 Ibid., p. 167, Nicolls to Bryce, 12 Nov. 1830.

42 PANS, RE54, pp. 66–71, Nicolls to Bryce, 28 Jan. 1831.

43 PANS, RE8, pp. 176–7, Archibald to Nicolls, 24 Dec. 1830.

44 PANS, RE54, pp. 66–71, Nicolls to Bryce, 28 Jan. 1831.

45 Ibid.

46 PANS, RE18, pp. 126–9, Bryce to Byham, 30 Jan. 1831, and Ellicombe minute, 18 Feb. 1831.

47 PAC, MG12, WO55, Vol. 868, p. 492, Nicolls to Ellicombe, 2 May 1831.

48 Ibid., pp. 486–8, 490–1, 496–8, Nicolls to Bryce, 2 May 1831, enclosing two estimates and three plans.

49 PANS, RE54, pp. 26–7, No. 202, Fanshawe to Nicolls, 29 June 1831.

50 PANS, RE55, unpaginated, Citadel accounts.

51 PANS, RE54, pp. 27–8, Nicolls to Bryce, 3 Sept. 1831.

52 Ibid., p. 28, Fanshawe to CRE, Nova Scotia, 1 Oct. 1831.

Truth and Consequences

1 PANS, RE8, unpaginated, Boteler to Bryce, 29 Oct. 1831.

2 PAC, MG12, WO55, Vol. 869, pp. 473–5, Boteler to Bryce, 14 Feb. 1832.

3 PANS, RE18, p. 160, Fanshawe to Boteler, 31 Dec. 1831, with enclosure.

4 PAC, MG12, WO55, Vol. 869, pp. 473–5, Boteler to Bryce, 14 Feb. 1832.

5 Ibid., p. 476, abstract of balances as of 31 Dec. 1831, signed by Boteler, 14 Feb. 1832.

6 Ibid., pp. 471–2, Bryce to Lt. Col. Cowper 28 March 1832.

7 Ibid., marginal comments by Sir James Kempt, 28 March 1832.

8 PANS, RE18, pp. 17–8, Fanshawe to Boteler, 30 March 1832, with enclosures.

9 PAC, MG12, WO55, Vol. 869, p. 507, Fanshawe to Boteler, 4 April 1832.

10 PAC MG12, WO44, Vol. 227, pp. 232–7, "Observations on Lt. Col. Boteler's letter dated . . . 12 [actually 14] February 1832," signed by Nicolls, 21 July 1832.

11 PANS, RE9, p. 147, Boteler to Pilkington, 24 Jan. 1833.

12 PANS, RE8, p. 216, list of maps, surveys, plans, etc. belonging to the Royal Engineers department, Halifax, dated 28 Oct. 1831.

13 PAC, MG12, WO55, Vol. 869, p. 514, Boteler to Bryce, 14 March 1832.

14 PANS, RE9, pp. 13–4, Boteler to Bryce, 14 April 1832; *see also* NHPS, plan 15-1832-4-1.

15 PANS, RE54, pp. 46–7, No. 255, Fanshawe to Boteler, 25 May 1832.

16 The sketch has not survived.

17 PAC, MG12, WO55, Vol. 869, p. 520, Boteler to Bryce, 4 Aug. 1832.

18 PANS, RE54, pp. 39–41, Boteler to Bryce, 12 April 1832.

19 PANS, RE18, p. 188, No. 252 [Fanshawe to Boteler], 23 May 1832, "This communication written on the blank half-margin of Lt. Col. Boteler's letter of April 12th 1832 which was returned with it."

20 PANS, RE54, pp. 38–9, Ellicombe to Boteler, 14 April 1832.

21 PANS, RE18, pp. 195–9, No. 259, Fanshawe to Boteler, 4 July 1832, enclosing (among others) letter from Bryce to Byham, 8 Jan. 1832.

22 PANS, RE9, pp. 32–3, Boteler to Bryce, 9 Nov. 1832.

23 PANS, RE18, p. 150, No. 216, Fanshawe to CRE, Nova Scotia, 1 Oct. 1831.

24 PAC, MG12, WO55, pp. 510–3, Boteler to Bryce, 13 April 1832, with enclosures. *See* NHPS, plan 02-1832-4-2.

25 PANS, RE54, pp. 47–8, No. 256, Fanshawe to Boteler, 22 May 1832.

26 H. Piers, op. cit., p. 111.

27 PAC, MG12, WO55, Vol. 870, p. 326, Byham to Pilkington, 24 April 1833.

28 Ibid., p. 330, Byham to Pilkington, 3 May 1833.
29 Ibid., p. 346, Byham to Pilkington, 28 May 1833.
30 PAC, MG12, WO44, Vol. 277, pp. 288–309, Boteler's first estimate for the completion of Fort George, signed by Lt. Wentworth, 12 June 1833.
31 Ibid., pp. 312–3, Report on Boteler's plan and estimates for the completion of Fort George, signed by Wentworth, 12 May 1833 (hereafter cited as Wentworth report).
32 Ibid.
33 Ibid., pp. 323–31, Boteler's second estimate, signed by Wentworth, 12 June 1833.
34 Ibid., pp. 312–3, Wentworth report.
35 Ibid., pp. 323–31, Boteler's second estimate, 12 June 1833.
36 Ibid., pp. 332–7, Boteler's third estimate, "Independent Estimate for the completion of Fort George . . . ." signed by Wentworth, 12 June 1833.
37 PANS, RE54, pp. 51–7, Peake to Pilkington, 12 June 1833. This is the source for all subsequent quotations in this paragraph and the next.
38 PAC, MG12,WO44, Vol. 227, pp. 339–56, Peake's first estimate, 12 June 1833.
39 Ibid., pp. 357–76, Peake's second estimate, 12 June 1833.
40 Ibid., pp. 377–96, Peake's third estimate, 12 June 1833.
41 Ibid., pp. 397–9, Peake's fourth estimate, 12 June 1833.
42 PANS, RE54, pp. 51–7, Peake to Pilkington, 12 June 1833.
43 PANS, RE55, unpaginated, Citadel accounts.
44 *See* in addition to the documents cited above (in notes 30–42) the following: PANS, RE9, p. 83, Peake to Pilkington, 12 June 1833 (covering letter); PAC, MG12, WO55, Vol. 870, p. 442, list of plans and estimates, 12 June 1833 (this merely lists plans, none of which has apparently survived); PAC, MG12, WO44, Vol. 227, pp. 318–9, Peake to Pilkington, 12 June 1833 (the second explanatory letter); and ibid., p. 320, Capt. River's report, 23 Sept. 1832.

Imbroglios

1 PANS, RE54, pp. 61–4, Jones to Pilkington, 15 March 1834. The estimate itself is in PAC, MG12, WO44, Vol. 227, pp. 248–92, "Estimate for the Completion of the Halifax Citadel," 15 March 1834. All subsequent quotations in this section are from this source.
2 PAC, MG12, WO55, Vol. 871, p. 332, Byham to Pilkington, 14 May 1834, E/559.
3 PANS, RE54, pp. 136–8, Pilkington to Couper, 4 June 1834.
4 PAC, MG12, WO55, Vol. 871, pp. 336–8, Byham to Pilkington, 27 June 1834, M/190.
5 PAC, MG12, WO44, Vol. 277, pp. 228–30, Ellicombe to Byham, 3 July 1834.
6 PANS, RE54, pp. 75–6, Byham to Respective Officers, Halifax, 3 Nov. 1834, O/1790.
7 Ibid., pp. 76–7, Statement B.
8 PAC, MG12, WO44, Vol. 227, pp. 205–17, Statement A.
9 PAC, MG12, WO55, Vol. 872, p. 304, Jones to the Inspector General of Fortifications, 14 Jan. 1835, with enclosures.
10 Ibid., p. 308, Remarks on statement O, 29 Dec. 1834.
11 Ibid., p. 306, memorandum, 29 Dec. 1834.
12 Ibid., p. 307.
13 Ibid., pp. 308–9, Remarks on Statement B, 29 Dec. 1834.
14 Ibid., pp. 302–3, Respective Officers to Board, 10 March 1835, with enclosed memorandum.
15 PAC, MG12, WO44, Vol. 227, pp. 195–6, Thomas to Byham, 17 July 1834.
16 PAC, MG12, WO55, Vol. 872, pp. 291–2, Byham to Mulcaster, 19 Aug. 1835, E/710.
17 PANS, RE54, pp. 141–6, Mulcaster to Byham, 26 Aug. 1835.
18 Kempt was invoked as having been both a Master General and a governor of Nova Scotia, and therefore a very reliable authority.
19 PAC, MG12, WO55, Vol. 872, p. 293, Butler to Mulcaster, 7 Sept. 1835, E/774.
20 PANS, RE19, p. 107, No. 376, Fanshawe to Jones, 23 Sept. 1835.
21 PAC, MG12, WO55, Vol. 872, pp. 294–5, Butler to Mulcaster, 25 Oct. 1835, T/301.
22 PAC, MG12, WO44, Vol. 227, pp. 130–2, memorandum on the Halifax Citadel, 3 Aug. 1835.
23 Ibid., pp. 132–5, precis of correspondence.
24 PAC, MG12, WO55, Vol. 873, pp. 698–9, Jones to Mulcaster, 1 Feb. 1836; ibid., pp. 703–26, revised estimate, 1 Feb. 1836.
25 PANS, RE54, pp. 119–22, No. 399, Fanshawe to Jones, 19 July 1836, enclosing observations by Mr. Cram, same date.
26 Ibid., pp. 71–4, Nicolls to Jones, 23 Nov. 1835.
27 PANS, RE25, unpaginated, Nicolls to Mulcaster, 2 Dec. 1835.
28 Ibid., memorandum by Col. Jones, 16 Dec. 1835.
29 Ibid., observations Nos. 1 and 2 by Col. Nicolls and ibid., Nicolls to Mulcaster, all dated 13 Jan. 1836.
30 Ibid., explanatory statements Nos. 1 and 2 by Col. Jones, 30 April 1836.
31 Ibid., memorandum by Col. Jones, 16 Dec. 1835.
32 R. F. Edwards, op. cit., p. 13.
33 PANS, RE9, p. 174, Jones to Inspector General of Fortifications, 10 Oct. 1834.
34 PANS, RE25, unpaginated, Mulcaster to Byham, 12 March 1835.
35 PANS, RE9, p. 213, Jones to Mulcaster, 9 July 1835.
36 PANS, RE19, p. 101, No. 375, Ellicombe to Jones, 11 Aug. 1835.
37 PAC, MG12, WO55, Vol. 872, pp. 294–5, Butler to Mulcaster, 25 Sept. 1835, T/301.
38 PANS, RE25, unpaginated, Byham to Mulcaster, 28 March 1836, E/235.
39 PANS, RE30, p. 99, Statement of unexpended balances to 31 March 1836, unsigned, dated 8 April 1836.
40 PAC, MG12, WO44, Vol. 277, pp. 116–7, Jones to Mulcaster, 19 Aug. 1836.
41 Ibid., p. 116, Ellicombe minute dated 17 Sept. 1836 on margin of Jone's letter of 19 Aug. 1836.
42 PANS, RE19, p. 206, Butler to Mulcaster, 23 Sept. 1836, E/814.
43 Ibid., No. 404, Fanshawe to Jones, 30 Sept. 1836.

44 PANS, RE9, p. 265, Jones to Mulcaster, 12 Oct. 1836.

45 PANS, RE25, unpaginated, Byham to Mulcaster, 17 April 1837, E/277.

46 PANS, RE30, p. 109, unexpended balances, 31 March 1837.

47 PANS, RE25, unpaginated, Mulcaster to Byham, 6 July 1837.

48 PAC, MG12, WO55, Vol. 873, pp. 633-4, memorandum of 6 July 1837, writer unidentified – presumably Mr. Cram.

49 PANS, RE25, unpaginated, Spearman to Byham, 30 Dec. 1837.

50 Ibid., memorandum by Mulcaster, 19 Jan. 1838.

51 PAC, MG12, WO55, Vol. 873, p. 636, Spearman to Byham, 27 March 1838.

52 PANS, RE25, unpaginated, No. 436, Fanshawe to Jones, 4 April 1838, with enclosures.

53 PANS, RE9, p. 283, Jones to IGF, 13 Sept. 1837.

54 PANS, RE20, pp. 4–7, Mulcaster to Byham, 7 April 1838.

55 PANS, RE30, p. 121, unexpended balance to 31 March 1838, unsigned, dated 7 April 1838.

56 PANS, RE9, p. 305, Jones to IGF, 24 Sept. 1838.

57 PANS, RE25, unpaginated, Byham to Mulcaster, 10 April 1839, F/321.

58 PANS, RE31, p. 1, unexpended balance to 31 April 1839, signed by Jones, 18 April 1839.

59 Ibid., p. 36, unexpended balance to 31 April 1840, signed by Jones, 16 April 1840.

60 PAC, RG8, C series, Vol. 1839, pp. 14–7, Mulcaster to Byham, 31 March 1840.

61 Ibid., p. 8, No. 496, Ellicombe to Jones, 22 April 1840.

Colonel Calder Revises

1 PAC, RG8, C series, Vol. 1839, pp. 96–7, No. 556, Matson to Jones, 19 Nov. 1841.

2 PANS, RE8, p. 99, Jones to Ellicombe, 11 March 1842.

3 PANS, RE55, unpaginated, Citadel accounts. This account of the state of the work is based on Capt. Wentworth's balance sheet of the sums expended on the items of the revised estimate, dated 6 Oct. 1840, and on a similar unsigned balance sheet showing expenditures to the end of 1841.

4 PAC, MG12, WO55, Vol. 877, p. 700 and ibid., Vol. 878, p. 512, quarterly reports dated 3 May 1842 and 28 Feb. 1843.

5 PANS, RE54, p. 152, No. 581, Fanshawe to Calder, 19 Sept. 1842, enclosing Howlet memorandum.

6 Ibid., p. 155, Calder to IGF, 15 Oct. 1842.

7 Ibid., p. 153, Calder to IGF, 15 Sept. 1842.

8 Ibid., pp. 157–60, No. 1, Calder to IGF, 6 Jan. 1843.

9 PANS, RE10, p. 178, list attached to this copy of the above letter.

10 PANS, RE54, pp. 164–6, Jones to IGF, 1 March 1843.

11 Ibid., pp. 162–4, Matson to Calder, 3 March 1843.

12 PANS, RE31, p. 100, Calder to Hewitson (Deputy Commissary General), 24 April 1843.

13 Ibid., p. 62, Hewitson to Calder, 26 April 1843.

14 Ibid., p. 64, Child to Calder, 27 April 1843.

15 Ibid., p. 63, Jackson to Calder, 27 April 1843.

16 Ibid., p. 65, Ince to Calder, 29 April 1843.

17 PAC, MG12, WO55, Vol. 878, pp. 514–22, estimate of alterations and renewals, 22 May 1843.

18 PANS, RE54, p. 169, Statement No. 1, 22 May 1843.

19 PANS, RE56, unpaginated, Mulcaster to Byham, 1 July 1843.

20 Ibid., Byham to Mulcaster, 12 July 1843, E/1889.

21 Ibid., No. 628, Matson to Calder, 18 July 1843.

22 PAC, MG12, WO55, Vol. 880, pp. 935–58, supplementary report and estimate, 31 March 1846.

23 Ibid., pp. 932–4, No. 140, Calder to IGF, 31 March 1846.

24 PANS, RE26, unpaginated, remarks of the IGF, 28 April 1846.

25 PANS, RE11, p. 101, list of armament, 21 July 1846.

26 PAC, MG12, WO55, Vol. 880, pp. 978–99, supplementary report and estimate (undated).

27 Ibid., pp. 1019–24, No. 155, Calder to IGF, 21 July 1846, enclosing "Replies to the Inspector General of Fortifications remarks . . . dated 31 March 1846."
A copy of the list of the proposed armament may be found in PANS, RE9, p. 101.

28 PANS, RE26, unpaginated, No. 809, Fanshawe to Calder, 15 Sept. 1846.

29 PAC, MG12, WO55, Vol. 880, p. 914, Director General of Artillery to the IGF, 15 Sept. 1846.

30 Ibid., pp. 912–3, Butler (for Byham) to Burgoyne, 2 Oct. 1846, E/1457.

31 PANS, RE26, unpaginated, No. 813, Matson to Calder, 9 Oct. 1846.

32 The 13 are:
1: Nicoll's original estimate (1825):
2–4: Boteler's three estimates (1832):
5–8: Peake's four estimates (1832–33):
9–10: Jones's first and second versions of the revised estimate (1834–36):
11: Calder's estimate (1843):
12: Calder's 1846 estimate (first version):
13: Calder's revised 1846 estimate.

". . . the necessity of remedying the leakage. . . ."

1 PANS, RE54, pp. 61–4, Jones to Pilkington, 15 March 1834.

2 PAC, MG12, WO55, Vol. 878, pp. 528–9, Jones to Mulcaster, 9 Aug. 1842.

3 Ibid., Vol. 877, pp. 707–8, Calder to Mulcaster, 12 July 1842.

4 Ibid., Vol. 878, pp. 515–6, 518–9, "Estimate for Alterations and Renewals," 22 May 1843, items 1, 2 and 6.

5 Ibid., pp. 525–6, No. 17, Calder to Mulcaster, 10 June 1843.

6 PANS, RE56, unpaginated, No. 635, Fanshawe to Calder, 26 Aug. 1843.

7 *See*, for example, ibid., "Report and Estimate of works . . . to be carried on at the citadel, 1847–8," n.d.

8 PAC, MG12, WO55, Vol. 880, pp. 935–58, "Supplementary Report and Estimate," 31 March 1846, item 6.

9 PANS, RE56, unpaginated, No. 792, Mulcaster minute of 28 April 1846, enclosed in letter of Matson to Calder, 6 May 1846.

10 PANS, RE26, unpaginated, undated draft of Calder's reply in margin of No. 792, 6 May 1846.

11 PANS, RE11, pp. 254–7, No. 234, Calder to Burgoyne, 5 Feb. 1848.

12 Ibid.

13 PAC, MG12, WO55, Vol. 882, pp. 477–80, "Special Estimate," 5 Feb. 1848.

14 Ibid., p. 478, surveyor's memorandum, 11 March 1848.

15 Ibid., p. 477, draft letter, n.d.

16 PANS, RE22, pp. 51–6, No. 900, Matson to Calder, 27 March 1848, enclosing Oldfield to Burgoyne, 23 March 1848 and memorandum of 22 March 1848.

17 PANS, RE11, pp. 272–5, No. 249, Calder to Burgoyne, 2 May 1848.

18 PANS, RE22, p. 62, No. 909, Matson to Calder, 23 May 1848.

19 PANS, RE11, p. 280, Calder to Holloway, 19 June 1848.

20 Ibid., p. 290, Calder to Burgoyne, 21 July 1848.

21 PANS, RE32, p. 44, Bazelgette to Savage, 5 July 1848.

22 Ibid., p. 84, Savage to Bazelgette, 7 Aug. 1848.

23 PAC, RG8, C series, Vol. 1825, p. 160, Crutchley to Savage, 14 Aug. 1848.

24 PANS, RE22, p. 81, No. 934, Fanshawe to Savage, 28 Oct. 1848.

25 PANS, RE11, p. 333, No. 272, Savage to Burgoyne, 25 Oct. 1848.

26 PANS, RE22, pp. 66–8, Holloway to Calder, 19 July 1848.

27 Ibid., pp. 82–3, Calder to Burgoyne, 24 Oct. 1848.

28 Ibid., pp. 91–2, No. 942, Fanshawe to Savage, 29 Nov. 1848.

29 PANS, RE12, pp. 12–28, No. 288, Savage to Burgoyne, 28 Dec. 1848.

30 PAC, RG8, C series, Vol. 1825, pp. 108–19, Burmester to Savage, 30 Nov. 1848; *also*, PANS, RE12, pp. 12–28, Return A, signed by Burmester and Savage, 28 Dec. 1848.

31 Ibid., No. 288, Savage to Burgoyne, 28 Dec. 1848.

32 Ibid., p. 10, No. 286, Savage to Burgoyne, 22 Dec. 1848.

33 PAC, RG8, C series, Vol. 1825, p. 365, Ince to Savage, 26 Dec. 1848.

34 PANS, RE22, pp. 65–6, Robinson (Deputy Commissary General) to Savage, 27 Dec. 1848.

35 PAC, RG8, C series, Vol. 1825, p. 360, Willis to Savage, 3 Jan. 1849, and ibid., pp. 263–4, Barrack Master to Savage, 29 Dec. 1848.

36 PANS, RE12, pp. 31–6, No. 292, Savage to Burgoyne, 9 Jan. 1849.

37 PANS, RE12, p. 114, Byham to Burgoyne, 24 Jan. 1849, S/18.

38 Ibid.

39 Ibid., p. 107, No. 955, Matson to Savage, 16 Jan. 1849.

40 PANS, RE12, pp. 70–2, No. 317, Savage to Burgoyne, 30 April 1849.

41 PANS, RE22, pp. 126–7, No. 974, Fanshawe to Savage, 29 March 1849, enclosing surveyor (Owen's) memorandum of 29 March 1849. A draft of Savage's reply (3 May 1849) is in the margin.

42 Ibid., p. 134, No. 983, Matson to Savage, 25 May 1849, enclosing Burgoyne minute of 18 May 1849.

43 Ibid., p. 141, No. 985, Matson to Savage, 25 May 1849, enclosing Burgoyne minute of 22 May 1849.

44 John Oldfield, "Memorandum on the Use of Asphalte." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers* (hereafter cited as *Professional Papers)*, n.s., Vol. 3 (1853), pp. 132–48.

45 PANS, RE12, pp. 56–7, No. 309, Savage to Burgoyne, 5 March 1849.

46 PANS, RE22, p. 128, No. 975, Fanshawe to Savage, 30 March 1849.

47 Ibid., pp. 135–6, Burgoyne minute of 9 May 1849 and demand of stores, 5 May 1849.

48 Ibid., pp. 137–9, memorandum of 8 May 1849, signed by John Owen (Surveyor of the Ordnance) and memorandum of 5 May 1849, signed by James McCutchon (for the surveyor).

49 Ibid., p. 135, Byham to Burgoyne, 5 May 1849, E/839.

50 Ibid., pp. 135–6, No. 984, part 1, Matson to Savage, 25 May 1849, enclosing letters of permission; and ibid., pp. 137–40, No. 984, part 2, Fanshawe to Savage, 25 May 1849, enclosing the surveyor's memoranda.

51 *Rivington's Notes on Building Construction Arranged to Meet the Requirements of the Syllabus of the Science and Art Department of the Committee of Cultural Education, South Kensington*, 2d ed. (London: Rivington's, 1889), Vol. 3, p. 251.

52 PANS, RE22, p. 136, demand of stores, 5 May 1849.

53 Ibid., pp. 142-3, Burgoyne to Byham, 9 May 1849.

54 Ibid., pp. 141–2.

55 Ibid., p. 140, Byham to Burgoyne, 22 May 1849.

56 Ibid., pp. 142–8, No. 988, Matson to Savage, 1 June 1849.

57 PANS, RE12, p. 88, No. 329, Savage to Burgoyne, 21 June 1849.

58 Ibid., p. 101, No. 344, Savage to Burgoyne, 2 July 1849.

59 Ibid., p. 105, No. 348, Savage to Burgoyne, 13 Aug. 1849.

60 Ibid., pp. 162–3, No. 394, Savage to Burgoyne, 16 May 1850.

61 Ibid.

62 PANS, RE22, pp. 158–60, No. 1008, no signature, letter to Savage, 28 July 1849, enclosing surveyor's memorandum of 27 July 1849.

63 Ibid.

64 Ibid. Savage's responses, dated 10 Oct. 1849, are in the margin of this copy of the letter.

65 PANS, RE12, p. 168, No. 480, Savage to Burgoyne, 26 June 1850.

66 PANS, RE22, pp. 1215–7, No. 1087, Matson to Savage, 4 June 1850, enclosing Owen's memorandum of 3 June 1850.

67 PANS, RE12, p. 172–5, No. 403, Savage to Burgoyne, 4 July 1850.

68 PAC, RG8, C series, Vol. 1445, pp. 6–9, abstract of Ordnance annual estimate, 1851–52, dated 19 Oct. 1850.

69 PANS, RE12, p. 195, No. 417, Savage to Burgoyne, 11 Oct. 1850.

70 PANS, RE22, pp. 232–3, No. 1116, Harding to Savage, 3 Dec. 1850, with enclosures.

71 PANS, RE12, p. 213, No. 428, Savage to Burgoyne, 24 Dec. 1850.

72 PANS, RE32, pp. 87–9, Foster (Deputy Ordnance Storekeeper, Trinidad) to Ince (Deputy Ordnance Storekeeper, Halifax), 21 Feb. 1850, with enclosures.

73 PANS, RE12, p. 214, No. 430, Savage to Burgoyne 13 Jan. 1851.
74 PAC, RG8, C series, Vol. 1839, pp. 335–6, No. 1124, Matson to Savage, 4 Feb. 1851.
75 PANS, RE12, p. 225, No. 437, Savage to Burgoyne, 14 Jan. 1851.
76 Ibid., pp. 216–9, No. 431, Savage to Burgoyne, 14 Jan. 1851.
77 PAC, RG8, C series, Vol. 1839, p. 354, No. 1133, (unidentified) to Savage, 27 Feb. 1851.
78 PANS, RE12, p. 240, No. 443, Savage to Burgoyne, 9 July 1851.
79 Ibid., p. 251, No. 452, Savage to Burgoyne, 9 July 1851.
80 PAC, RG8, C series, Vol. 1445, p. 14, Citadel new works return, unsigned, dated 3 Aug. 1851.
81 Ibid., pp. 12–13a, abstract of Ordnance annual estimate for 1852–53, dated 3 Aug. 1851.
82 Ibid., pp. 28–30, abstract of Ordnance annual estimate for 1853–54, dated 29 Sept. 1852.
83 PANS, RE12, p. 423, No. 544, Savage to Burgoyne, 12 May 1853.
84 PANS, RE23, p. 41, No. 1271, Matson to Savage, 30 May 1853, with enclosures.
85 PANS, RE12, p. 447, No. 559, Savage to Burgoyne, 16 Aug. 1853.
86 PANS, RE23, p. 51, No. 1286, Sandham to Savage, 12 Sept. 1853, with enclosures.
87 PAC, RG8, C series, Vol. 1445, pp. 48–50, abstract of Ordnance annual estimate, 1854–55, n.d.
88 PANS, RE12, pp. 497-503, No. 594, Savage to Burgoyne, 12 June 1854, with enclosures.
89 Ibid.
90 Ibid.
91 Ibid.

". . . and keep your powder dry!"

1 Henry Philpotts, "Copy of a Report on the Demolition of the Old Magazine in the Citadel of Halifax, Nova Scotia, on the 7th of April, 1847 . . . ," *Corps Papers, and Memoirs on Military Subjects Compiled from the Contributions of the Officers of the Royal Engineers and the East India Company's Engineers* (hereafter cited as *Professional Papers*), 3rd series, Vol. 1 (1849–50), pp. 214–6.
2 PAC, MG12, WO55, Vol. 881, p. 847, No. 193, Calder to Burgoyne, 12 May 1847.
3 Ibid., Vol. 882, p. 485, Calder to Burgoyne, 11 April 1848.
4 Ibid., marginal notation.
5 PANS, RE11, pp. 276–7, No. 250, Calder to Burgoyne, 10 May 1848
6 PANS, RE22, p. 63, No. 911, Matson to Calder, 25 May 1848.
7 PANS, RE56, unpaginated, revised estimate, 1836.
8 PAC, RG8, C series, Vol. 1825, memorandum, 24 Nov. 1845, signed by Calder.
9 PANS, RE56, unpaginated, estimate of alterations and renewals, 22 May 1843.
10 PAC, MG12, WO55, Vol. 881, pp. 858–9, No. 208, Calder to Burgoyne, 7 Aug. 1847.
11 PAC, RG8, C series, Vol. 1444, pp. 374–81, estimate, n.d.
12 Ibid., Vol. 1839, pp. 168–9, No. 863, Fanshawe to Calder, 3 Sept. 1847.
13 PANS, RE11, p. 232, No. 223, Calder to Burgoyne, 15 Nov. 1847
14 PAC, MG12, WO55, Vol. 882, pp. 403–4, Secretary at War to Byham, 26 Jan. 1848.
15 Ibid., p. 402, Byham to Burgoyne, 2 Feb. 1848.
16 Ibid., Vol. 880, p. 913, armament proposed for Fort George, 21 July 1846.
17 Ibid., p. 914, Director General of Artillery to Burgoyne, 15 Sept. 1846.
18 Ibid., Vol. 883, p. 706, Gordon memorandum, n.d.
19 Ibid.
20 Ibid., pp. 710–1, Gordon to Burgoyne, 11 June 1849.
21 Ibid., p. 705, Byham to Burgoyne, 23 June 1849, D/64.
22 PANS, RE12, p. 96, No. 339, Savage to Burgoyne, 23 July 1849.
23 PANS, RE32, p. 92, Director General of Artillery to Lt. Col. Willis (CRA), 13 March 1851.
24 Ibid., Willis to Savage, 25 April 1851.
25 PANS, RE33, p. 56, Fraser to Savage, 25 Jan. 1853.
26 Ibid., pp. 76–7, Savage to Fraser, 25 Jan. 1853.
27 PANS, RE12, p. 415, No. 545, Savage to Burgoyne, 23 April 1853.
28 PANS, RE23, p. 38, No. 1269, Matson to Savage, 27 May 1853.
29 PAC, RG8, C series, Vol. 1445, pp. 48–50, abstract of Ordnance annual estimate, 1854–55, undated (presumably Sept. 1853).
30 PANS, RE33, p. 67, Ince to Savage, 19 Oct. 1852.
31 Ibid., Savage to Respective Officers, 23 Oct. 1852.
32 Ibid., p. 54, Respective Officers to Savage, 26 Oct. 1852.
33 PANS, RE12, pp. 380–1, No. 524, Savage to Burgoyne, 27 Oct. 1852.
34 PANS, RE23, p. 17, No. 1240, Matson to Savage, 25 Nov. 1853.
35 PANS, RE12, pp. 416–8, No. 546, Savage to Burgoyne, 23 April 1853.
36 Ibid.
37 PANS, RE23, p. 42, No. 12174, Matson to Savage, 4 June 1853, enclosing letter from Butler to Burgoyne, 30 May 1853, E/453, and Burgoyne minute, 12 May 1853.
38 PAC, RG8, C series, Vol. 1445, pp. 48–50, abstract of Ordnance Annual Estimate, 1854-55, n.d.
39 PANS, RE27, p. 80, Harding to Butler, 14 Nov. 1853.
40 PANS, RE12, pp. 499–504, Lt. Parson's report, 13 Feb. 1854.
41 Ibid., memorandum by Lt. Col. Savage appended to the above, n.d.
42 PAC, MG12, WO55, Vol. 887, pp. 434–5, special service estimate, 14 Sept. 1854.
43 PANS, RE46, p. 247, Poignard to IGF, 29 Sept. 1854, IGF/1116.
44 PAC, RG8, C series, Vol. 1445, pp. 52–4, abstract of Ordnance annual estimate, 1855–56.
45 PANS, RE33, pp. 86–97, tabular statement, 27 Nov. 1854.
46 PANS, RE13, pp. 31–3, No. 627, Stotherd to Burgoyne, 17 Jan. 1855.
47 Ibid.
48 Ibid., p. 34, No. 628, Stotherd to Burgoyne, 30 Jan. 1855.
49 PANS, RE27, p. 117, Harding to Stotherd, 13 Feb. 1855.

50 PANS, RE33, pp. 98–9, Capt. Grain, Capt. Barry and Thomas Hanlin to Stotherd, 24 Feb. 1855.
51 Ibid., report by Capt. Barry and Capt. Grain.
52 PANS, RE13, pp. 43–5, No. 636, Stotherd to Burgoyne, 28 Feb. 1855.
53 PANS, RE27, unpaginated, Matson to Stotherd, 2 April 1855, and Harding minute of 17 March 1855.
54 PANS, RE13, pp. 60–1, No. 646, Stotherd to Burgoyne, 21 June 1855.
55 PAC, RG8, C series, Vol. 1445, pp. 56–62, Citadel cavalier special estimate, 21 May 1855.
56 PANS, RE27, unpaginated, Laffin to Stotherd, 28 July 1855.
57 PANS, RE13, pp. 78–88, No. 660, Stotherd to Burgoyne, 26 Aug. 1855.
58 PAC, RG8, C series, Vol. 1445, pp. 66–9, abstract of Ordnance annual estimate, 1856–57.
59 PANS, RE13, pp. 95–105, No. 665, Stotherd to Burgoyne, 26 Sept. 1855.
60 Ibid., pp. 187ff., No. 723, Stotherd to Burgoyne, 17 July 1856, enclosing tabular statement dated 17 June 1856.
61 PAC, MG12, WO55, Vol. 1558, part 7, report of the committee on the state of the Citadel, 25 May 1856.
62 Ibid.

The Very Model of a Modern Major General

1 Charles M. Clode, *The Military Forces of the Crown; their administration and government* (London: John Murray, 1869), pp. 769–70. The other seven were the Secretary of State for the Home Department, the Treasury, the Army Medical Department, the Audit Office, the commissioners of the Chelsea Hospital, the Board of General Officers and the Paymaster General.
2 Francis Duncan, *The History of the Royal Regiment of Artillery. Compiled from the Original Records* (London: J. Murray, 1879), Vol. 1, p. 10.
3 *Dictionary of National Biography*, Vol. 11, pp. 902–4.
4 Ibid., pp. 904–5.
5 PAC, RG8, C series, Vol. 1348, pp. 46–8, Le Marchant to Secretary of State for War, 2 July 1855.
6 PANS, RE13, p. 60, No. 646, Stotherd to Burgoyne, 21 June 1855; PAC, RG8, C series, Vol. 1445, pp. 56–62, barracks special services, report and estimate, 21 June 1855.
7 PANS, RE27, unpaginated, Laffin to Stotherd, 28 July 1855, T/265.
8 PANS, RE13, p. 78, Stotherd to Burgoyne, 26 Aug. 1855.
9 PAC, RG8, C series, Vol. 1445, pp. 66–9, abstract of Ordnance annual estimate, 1856–57, 22 Sept. 1855.
10 PANS, RE17, pp. 89–92, No. 662, Stotherd to Burgoyne, 22 Sept. 1855.
11 PANS, RE13, pp. 95–111, No. 665, Stotherd to Burgoyne, 26 Sept. 1855.
12 PANS, RE33, pp. 142–4, Thomas Le Marchant to Stotherd, 10 Oct. 1855.
13 PANS, RE33, pp. 189–204, Stotherd to Le Marchant, 22 Nov. 1855.
14 PANS, RE13, p. 118, No. 670, Stotherd to Burgoyne, 22 Nov. 1855.
15 PANS, RE23, p. 151, Burgoyne memorandum, 15 Dec. 1855.
16 Ibid., pp. 159–60, Matson to CRE, Nova Scotia, with enclosure.
17 PAC, MG12, WO55, Vol. 887, p. 702, Thomas Le Marchant to Stotherd, 9 March 1855.
18 PANS, RE13, p. 51, Stotherd to Burgoyne, 13 March 1856.
19 PAC, MG12, WO55, Vol. 887, pp. 703–16, contract specifications and contracts, 1828–30.
20 PANS, RE23, pp. 166–7, Burgoyne to Stotherd, 3 April 1856, with enclosures.
21 PANS, RE13, p. 167, No. 705, Stotherd to Burgoyne, 7 May 1856.
22 PAC, MG12, WO55, Vol. 1558, section 7, "Report of the Committee on the State of Citadel and Harbour Defences of Halifax, Nova Scotia," 5 May 1856.
23 Ibid., p. 68, Appendix I.
24 Ibid., Appendix J.
25 Ibid., p. 69, Appendix K.
26 Ibid., pp. 66–7, Appendix H.
27 *See* above, "Truth and Consequences."
28 PAC, MG12, WO55, Vol. 1558, section 7, Appendix E.
29 Ibid.
30 Ibid., pp. 74–5, Appendix O.
31 PANS, RE13, p. 167, No. 705, Stotherd to Burgoyne, 7 May 1856.

Of Mr. McCully's Cow and Other Matters

1 PAC, RG8, C series, Vol. 1445, p. 112, "New Works. To Accompany Ordnance Annual Estimate, 1858–9," signed by Col. Stotherd, n.d.
2 Ibid., Vol. 1435, pp. 10–1, No. 843, Stotherd to Burgoyne, 13 Dec. 1857.
3 Ibid., Vol. 1445, pp. 107–9, abstract of Ordnance annual estimate, 1858–59, 6 Oct. 1857.
4 Ibid., pp. 123–4, abstract of Ordnance annual estimate, 1859–60, 5 Oct. 1858.
5 Ibid., Vol. 1449, No. 8, Royal Engineer Department, Grass and Grazing, signed by Maj. Gen. Trollope, 12 April 1858.
6 Ibid., Vol. 1435, No. 918, Stotherd to Burgoyne, 16 June 1858.
7 *Dictionary of National Biography*, s.v. "Richard John Nelson (1803–77)".
8 Richard John Nelson, "Fragments of the Composition and Construction of Military Reports," *Professional Papers*, n.s., Vol. 7 (1858), pp. 73–80.
9 Idem, "Syllabus of the Studies, Duties, &c., of an Officer of the Royal Engineers . . ." in ibid., pp. 130–33.
10 Idem, "Discussion and Project for an Enciente," in ibid., Vol. 1 (1858), pp. 14–20.
11 PAC, RG8, C series, Vol. 1435, pp. 147–8, No. 970, Nelson to Burgoyne, 14 Dec. 1858.
12 Ibid., pp. 151–3, No. 976, Nelson to Burgoyne, 14 Dec. 1858.
13 This plan has not been located.
14 PAC, RG8, C series, Vol. 1435, pp. 160–1, No. 984, Nelson to Burgoyne, 30 Dec. 1858.
15 Ibid., pp. 177–8, No. 100, Nelson to Burgoyne, 23 Feb. 1859; ibid., pp. 191–2, Nelson to Burgoyne, 21 April 1859.
16 Ibid., p. 207, No. 1035, Nelson to Burgoyne, 24 June 1859.
17 Ibid., Vol. 1653A, pp. 166ff., Fortifications annual estimate, 1859–60, 29 Dec. 1858.
18 Ibid.
19 Ibid., Vol. 1449, pp. 79–80, "Schedule of Tenders . . . 15 April 1859." Interestingly, Neville offered only £16 3s.

9d. for the least, which had cost him £33 5s. 0d. the previous year. Perhaps he had found the land less useful than he expected, or possibly he had been harassed by Col. Nelson after the latter arrived in Halifax the previous fall.

20 Fordyce signed his letter as both Assistant Military Secretary and Assistant Quartermaster General. Apparently he acted in both roles, but it is the first which most concerns us. All correspondence between Nelson and Trollope was directed through him.

21 PAC, RG8, C series, Vol. 1341, p. 388, Nelson to Fordyce, 18 April 1859.

22 Ibid., p. 387, Trollope to Secretary of State for War, 19 April 1859.

23 Ibid., Vol. 1447, pp. 12–3, summons, 7 June 1859.

24 Ibid., p. 17, Nelson to Fordyce, 19 July 1859.

25 Ibid., Vol. 1650, pp. 116–7, Fordyce to Nelson, 5 Aug. 1859.

26 This letter has not been located. The author has reconstructed the suggestions from Trollope's replies to them.

27 PAC, RG8, C series, Vol. 1342, pp. 99–100, Trollope to Secretary of State for War, 15 Oct. 1859.

28 Ibid., Vol. 1447, pp. 63–4, Nelson to Ritchie, 17 Dec. 1859.

29 Ibid., Vol. 1342, p. 150, Ritchie to Nelson, 19 Dec. 1859.

30 Ibid., p. 149, Nelson to Fordyce, 20 Dec. 1859.

31 Ibid., pp. 146–7, Trollope to Secretary of State for War, 7 May 1860.

32 Ibid., Vol. 1650, pp. 169–70, Fordyce to Nelson, 7 May 1860.

33 Ibid., Vol. 1342, pp. 23–4, Nelson to Fordyce, 8 May 1860.

34 Ibid., pp. 227-9, Trollope to Secretary of State for War, 11 May 1860.

35 Ibid., Vol. 1435, pp. 307–8, No. 1121, Nelson to Burgoyne, 6 Aug. 1860.

36 Ibid., pp. 303–5, No. 1118, Nelson to Burgoyne, 12 Aug. 1860.

37 Ibid., Vol. 1663A, p. 236, Fortifications annual estimate, 1861–62, 24 Oct. 1860.

38 Ibid., Vol. 1436, pp. 45–9, No. 1155, Nelson to Burgoyne, 8 Jan. 1861.

39 Ibid., pp. 59–63, No. 1163, Nelson to Burgoyne, 6 Feb. 1861.

40 Ibid., pp. 245–6, No. 1265, Westmacott to Burgoyne, 13 May 1862.

41 PAC, RG8, C series, Vol. 1653A, pp. 305–9, Fortifications annual estimate, 1862-63, n.d.

42 Ibid., pp. 320–77, Fortifications, lands and military store buildings annual estimate, 1864–65, 4 Jan. 1864.

43 Ibid., Vol. 1436, No. 1210, Dawson to Burgoyne, 25 July 1861.

44 Ibid., Vol. 1447, Nelson to Ritchie, 29 June 1861.

Epilogue

1 PAC, RG8, C series, Vol. 1435, pp. 318–20, report of Cols. Nelson and Benn, 17 Aug. 1860.

2 Ibid., Vol. 1342, pp. 289–90, Trollope to Adjutant General, 25 Aug. 1860.

3 Nicholas Augustus Woods, *The Prince of Wales in Canada and the United States* (London: Bradbury and Evans, 1861), p. 30.

4 Whitworth Porter, *History of the Corps of Royal Engineers* (London: Longmans, Green, 1889), Vol. 2, p. 217.

5 Basil Perronet Hughes, *British Smooth-Bore Artillery: The Muzzle-Loading Artillery of the 18th and 19th Centuries* (London: Arms and Armour Press, 1969), p. 30.

6 J. E. W. Headlam and Sir Charles Callwell, *History of the Royal Regiment of Artillery* (Woolwich: Royal Artillery Institution, 1931–40), Vol. 1, pp. 143–4.

7 H. Tyler, "Remarks on Fortification; with Especial Reference to Rifled Weapons," *Professional Papers*, n.s., Vol. 9 (1860), p. 95.

8 W. F. D. Jervois, "Observations Relating to the Works in Progress and Proposed for the Defence of the Naval Ports, Arsenals and Dockyards," in ibid., pp. 129–39.

9 John Fox Burgoyne, "Memorandum on the Increased Power of Breaching to be Obtained by the Use of Rifled Ordnance," in ibid., Vol. 10 (1861), pp. 1–7.

10 Lt. Col. Ross, "Report on the Siege Operations Carried on at Juliers in September 1860, for an Instruction of the Prussian Army, Especially with reference to the effects of Rifled Guns," in ibid., pp. 159–69.

Appendix C: Cavalier

1 NHPS, plan 03-1825-12-3.

2 PANS, RE56, unpaginated, "Revised Estimate for completing Halifax Citadel," 2 Feb. 1836.

3 PANS, RE54, pp. 61–4, Jones to Pilkington, 15 March 1834.

4 PANS, RE56, unpaginated, "Estimate of the Alterations and Renewals for the Citadel . . . ," 22 May 1843.

5 Ibid., item 8, and NHPS, plan 03-1843-5-5.

6 PANS, RE56, unpaginated, "Supplementary Report and Estimate of Works . . . ," 31 March 1846, item 9, and NHPS, plan 03-1846-3-11.

7 PANS, RE33, pp. 86–97, tabular statement, 27 Nov. 1854, and PANS, RE13, pp. 187 ff., No. 723, Stotherd to Burgoyne, 17 July 1856, enclosing tabular statement dated 17 June 1856.

8 PAC, RG8, C series, Vol. 1445, pp. 56–62, "Report and Estimate for roofing over the Cavalier . . . ," 21 June 1855, and NHPS, plans 03-1849-4-4 and 03-1855-6-1.

9 PAC, MG12, WO55, Vol. 1558, part 7, "Report of the Committee . . . ," 5 May 1856.

10 Ibid., Vol. 887, fols. 434–5, "Report and Estimate for altering the position of the Stoves . . . ," 14 Sept. 1854, and NHPS, plan 03-1854-9-1.

11 PANS, RE33, pp. 86–97, tabular statement, 27 Nov. 1854, and PANS, RE13, pp. 187 ff., No. 723, Stotherd to Burgoyne, 17 July 1856, enclosing tabular statement dated 17 June 1856.

Appendix D: Magazines

1 PAC, MG12, WO55, Vol. 869, fols. 473–5, Boteler to Bryce, 14 Feb. 1832.

2 PAC, MG12, WO44, Vol. 227, fols. 287 ff., "Estimates for the completion of Fort George . . . ," 12 June 1833.

3 Ibid., fols. 323 ff., "Comparative Estimate . . . ," 12 June 1833.

4 Ibid., fols. 339 ff., "Estimate N° 1 . . . ," 12 June 1833.

5 Ibid., fols. 248 ff., "Estimate," 15 March 1834 and NHPS, plan 06-1834-3-6.
6 PANS, RE54, pp. 146–8, Pilkington to Couper, 4 June 1834.
7 PANS, RE56, unpaginated, "Revised Estimate for completing Halifax Citadel . . .," 2 Feb. 1836.
8 PANS, RE54, pp 119–22, No. 399, Fanshawe to Jones, 14 July 1836.
9 PANS, RE56, unpaginated, "Revised Estimate for completing Halifax Citadel . . .," 2 Feb. 1836.
10 Ibid., "Estimate of the Alterations and Renewals for the Citadel . . .," 22 May 1843.
11 Ibid., and NHPS, plan 06-1843-5-2.
12 Ibid., "Supplementary Report and Estimate of Works . . .," 31 March 1846.
13 PANS, RE26, unpaginated, remarks of the IGF, 28 April 1846.
14 H. Philpotts, op. cit., pp. 214–6, and NHPS, plan 05-1847-4-1.
15 PANS, RE12, pp. 162–3, No. 394, Savage to Burgoyne, 16 May 1850.
16 PAC, MG12, C series, Vol. 1653A, pp. 622–3, civil buildings estimate, 1859–60, dated 16 Oct. 1858.
17 PANS, RE33, p. 67, Savage to Respective Officers, 23 Oct. 1852 and PANS, RE12, pp. 416–8, No. 546, Savage to Burgoyne, 23 April 1853.
18 NHPS, plan 06-1852-1-1.
19 PAC, RG8, C series, Vol. 1653A, pp. 622–4, civil buildings estimate, 1859–60, 16 Oct. 1858. *See also* NHPS, plan 06-1858-8-1.
20 NHPS, plans 21-1902-8-1 and 8-3.

Appendix E: Casemates

1 NHPS, plan 01-1825-12-1.
2 PANS, RE56, unpaginated, "Revised Estimate . . .," 2 Feb. 1836.
3 Ibid., and NHPS, plan 04-1836-2-13.
4 PANS, RE54, pp. 157–60, Calder to IGF, 6 Jan. 1843.
5 Ibid., pp. 162–4, Matson to Calder, 3 March 1843.
6 PANS, RE56, unpaginated, "Estimate of the Alterations and Renewals . . .," 22 May 1843 and NHPS, plan 04-1843-5-1.
7 PANS, RE56, unpaginated, "Estimate of the Alterations and Renewals . . .," 22 May 1843, and NHPS, plan 04-1843-5-3.
8 NHPS, plans 04-1844-3-1 and 3-2.
9 PANS, RE56, unpaginated, "Report & Estimate of Works & Repairs . . . 1844–5," dated 20 Oct. 1843.
10 Ibid., "Supplementary Report and Estimate . . .," 31 March 1843.
11 Ibid., and NHPS, plans 08-1846-3-2 and 3-3.
12 PAC, RG8, C series, Vol. 1825, pp. 108–19, report by Lt. Burmester, 30 Nov. 1848.
13 PANS, RE56, unpaginated, "Revised Estimate . . .," 2 Feb. 1836.
14 PAC, MG12, WO55, Vol. 878, fols. 528–9, Jones to Mulcaster, 9 Aug. 1842.
15 Ibid., Vol. 877, fols. 707–8, Calder to Mulcaster, 12 July 1842.
16 PANS, RE11, pp. 254–7, Calder to Burgoyne, 5 Feb. 1848; PAC, MG12, WO55, Vol. 882, fols. 479–80, "Special Report and Estimate . . .," 5 Feb. 1848, and NHPS, plan 04-1848-2-1.
17 *See,* for example, PANS, RE22, pp. 51–6, No. 900, Matson to Calder, 27 March 1848, enclosing Oldfield to Burgoyne, 23 March 1848 and memorandum of 22 March 1848; ibid., p. 62, Matson to Calder, 23 May 1848.
18 NHPS, plan 04-1848-12-3.
19 PAC, RG8, C series, Vol. 1825, pp. 108–19, report by Lt. Burmester, 30 Nov. 1848.
20 NHPS, plans 04-1848-12-2 and 12-3.
21 PAC, RG8, C series, Vol. 1825, No. 288, Savage to Burgoyne, 22 Dec. 1848.
22 PAC, MG12, WO55, Vol. 883, fols. 843–54, "Special Estimate for Staunching the Casemates . . .," 30 April 1849.
23 NHPS, plans 01-1849-4-2 and 4-3.
24 *Rivington's Notes on Building Construction Arranged to Meet the Requirements of the Syllabus of the Science and Art Department of the Committee of Cultural Education, South Kensington,* 2d ed. (London: Rivington's, 1889), Vol. 3, pp. 251–2.
25 NHPS, plan 04-1854-6-1.
26 PANS, RE12, pp. 498–502, report by Lt. Parsons, 13 Feb. 1854.
27 PANS, RE33, pp. 86–97, tabular statement, 28 Nov. 1854.
28 PANS, RE13, pp. 187 ff., No. 723, Stotherd to Burgoyne, 17 July 1856, enclosing tabular statement dated 17 July 1856.
29 PAC, RG8, C series, Vol. 1449, pp. 271–80, abstract of barracks annual estimate, 1863–64, dated 25 Dec. 1862.
30 PAC, MG12, WO55, Vol. 887, fols. 656–8, "Report and Estimate . . .," 15 Jan. 1856, and NHPS, plan 04-1856-1-1.
31 PAC, RG8, C series, Vol. 1653A, pp. 164–230, fortifications annual estimate, dated 29 Dec. 1859, and NHPS, plan 04-1859-11-1.
32 PAC, RG8, C series, Vol. 1653A, pp. 164–230, civil buildings annual estimate, 1862–63, dated 18 Nov. 1861, and NHPS, plan 07-1861-11-1.

Appendix F: Drainage

1 PANS, RE56, unpaginated, "Supplementary Report and Estimate of Works . . .," 31 March 1846.
2 PAC, MG12, WO55, Vol. 873, fols. 637–77, "Revised Estimate . . .," 2 Feb. 1836, and NHPS, plan 28-1836-2-3.
3 Ibid.
4 PANS, RE56, unpaginated, "Supplementary Report and Estimate . . .," 31 March 1846, and NHPS, plan 04-1849-4-1.
5 Ibid.
6 NHPS, plan 28-1846-3-10.
7 PAC, MG12, WO55, Vol. 883, fols. 843–54, "Special Estimate for Staunching the Casemates . . .," 30 April 1849.
8 Ibid.
9 NHPS, plans 01-1849-4-1, 4-2 and 4-3.
10 NHPS, plans 12-0003-13-2 and 12-1891-2-1.
11 NHPS, plan 01-1858-8-3.
12 Harry Piers, op. cit., p. 42, n. 5, and NHPS, plan 01-1891-11-1.
13 PAC, MG12, WO55, Vol. 1558, part 7, "Report of Committee on state of the Citadel . . .," 5 May 1856.
14 PAC, RG8, C series, Vol. 1346, pp. 386–8, Burnaby to AQMG, 1 Sept. 1869.
15 NHPS, plan 15-1838-13-1.
16 NHPS, plan 04-1856-1-1.
17 NHPS, plan 01-1858-8-2.

Appendix G: Walls

1 PAC, MG12, WO55, Vol. 1558, part 7, "Observations on the Defence of Nova Scotia," App. L.

2 Ibid., App. L, M and N.

3 Ibid., App. N; PANS, RE8, pp. 168–9, Respective Officers to Byham, 11 Nov. 1830.

4 PANS, RE54, pp. 67–71, Nicolls to Bryce, 28 Jan. 1831.

5 Ibid.

6 Ibid., pp. 27–8, Nicolls to Bryce, 3 Sept. 1831.

7 NHPS, plan 13-1832-2-6, detail.

8 PANS, RE56, unpaginated, "Revised Estimate for Completing Halifax Citadel . . . ," 2 Feb. 1836.

9 Ibid., "Estimate of Alterations and Renewals . . . ," 22 May 1843.

10 Ibid., and NHPS, plan 04-1843-5-1.

11 PANS, RE33, p. 99, report of Capts. Barry and Grain, 24 Feb. 1855.

12 PAC, MG12, WO55, Vol. 1558, part 7, "Observations on the Defence of Nova Scotia," 1856.

13 John Joseph Greenough, "The Halifax Citadel, 1825–60: A Narrative and Structural History," Manuscript Report Series, No. 154, National Historic Parks and Sites Branch, Parks Canada, Ottawa, Part 2, Fig. 68.

14 NHPS, plan 15-1832-4-1.

15 NHPS, plan 01-1832-2-1.

16 PAC, MG12, WO55, Vol. 869, fols. 473–5, Boteler to Bryce, 14 Feb. 1832.

17 Ibid., fol. 514, Boteler to Bryce, 13 March 1832.

18 Ibid., and NHPS, plan 15-1832-4-1.

19 NHPS, plan 15-1832-5-1.

20 PAC, MG12, WO55, Vol. 869, fol. 520, Boteler to Bryce, 4 Aug. 1832.

21 NHPS, plan 15-1838-13-1.

22 PAC, MG12, WO44, Vol. 227, fols. 287–309, "N° 1 Estimate for the completion of Fort George . . . ," 12 June 1833.

23 Ibid., fols. 323–31, "N° 2 Comparative Estimates . . . ," 12 June 1833.

24 Ibid., fols. 339–56, "Estimate N° 1 . . . ," 12 June 1833.

25 Ibid., fols. 248–92, "Estimate for Completion . . . ," 15 March 1834; PAC, MG12, WO55, Vol. 873, fols. 637–77, "Revised Estimate . . . ," 2 Feb. 1836.

26 NHPS, plan 15-1833-6-15.

27 NHPS, plan 15-1836-2-9.

28 NHPS, plans 11-1833-6-4, 6-5, 6-10 and 02-1825-12-2.

29 NHPS, plans 15-1836-2-9 and 11-1834-3-2.

30 PANS, RE56, unpaginated, "Revised Estimate for Completing the Halifax Citadel . . . ," 2 Feb. 1836, and NHPS, plans 11-1834-3-2 and 11-1836-2-5.

31 PANS, RE56, unpaginated, "Revised Estimate for Completing the Halifax Citadel . . . ," 2 Feb. 1836.

32 Ibid., "Report & Estimate of Works & Repairs . . . ," 20 Oct. 1843.

33 Ibid., "Supplementary Report and Estimate . . . ," 31 March 1843, and NHPS, plan 11-1846-3-3.

34 PAC, MG12, WO55, Vol. 883, fols. 843–54, "Special Estimate . . . ," 30 April 1849.

35 Ibid., Vol. 1558, part 7, "Observations on the Defence of Nova Scotia," 1856.

36 NHPS, plan 11-1875-10-3A.

Appendix H: The Gate and Bridge

1 PAC, MG12, WO55, Vol. 873, fols. 637–77, "Revised Estimate . . . ," 2 Feb. 1836.

2 NHPS, plans 24-1850-1-1 and 1-2.

3 NHPS, plan 04-1846-3-6.

Appendix I: The Sally Ports

1 NHPS, plan 04-1856-1-1.

2 PAC, MG12, WO55, Vol. 873, fols. 637–77, "Revised Estimate . . . ," 2 Feb. 1836.

3 PAC, RG8, C series, Vol. 1653A, pp. 129–63, Ordnance annual estimate, 1859–60.

Appendix J: Ravelins

1 NHPS, plans 01-1825-12-1 and 01-1832-4-1.

2 NHPS, plan 13-1831-5-1.

3 Compare NHPS, plans 13-1832-2-6 and 13-1831-5-1.

4 NHPS, plan 13-1831-5-1.

5 PAC, MG12, WO55, Vol. 869, fols. 473–5, Boteler to Bryce, 14 Feb. 1832.

6 For a full discussion of the process by which the decision was arrived at, *see* above. Most of the material relating to the changes in design and the various proposals made in the early 1830s is in PAC, MG12, WO44, Vol. 227, the entries for July 1843.

7 PAC, MG12, WO55, Vol. 873, fols. 637–77, "Revised Estimate for completing Halifax Citadel . . . ," 2 Feb. 1836.

8 *See* ibid., and NHPS, plans 13-1836-2-6 and 2-7.

9 PAC, MG12, WO55, Vol. 878, fols. 514–22, "Estimate for Alterations and Renewals . . . ," 22 May 1843.

10 Ibid.

11 Ibid., Vol. 880, fol. 939, "Supplementary Estimate . . . ," 31 March 1846.

12 Ibid., fols. 940–3.

13 PANS, RE26, unpaginated, No. 792, Matson to Calder, 6 May 1846, enclosing remarks of the IGF.

14 Col. Calder was wrong. The north and south ravelins were not *re*-built under the provisions of the 1836 estimate.

15 PAC, MG12, WO55, Vol. 880, fols. 1019–24, No. 155, Calder to IGF, 21 July 1846.

16 Ibid., fols. 514–22, and NHPS, plan 13-1846-3-4A.

17 PAC, MG12, WO55, Vol. 881, fol. 847, No. 193, Calder to Burgoyne, 12 May 1847.

18 Ibid., Vol. 882, fol. 485, Calder to Burgoyne, 12 May 1847.

19 PANS, RE22, p. 63, No. 911, Matson to Calder, 25 May 1848.

Appendix K: Armament

1 PAC, MG12, WO44, Vol. 227, fols. 102–7, "Estimate of the Expense . . . ," 20 Dec. 1825.

2 Ibid., and NHPS, plans 01-1825-12-1, 12-5, 12-7, 01-1828-10-1 and 10-1A, and 02-1832-4-1.

3 NHPS, plan 01-1832-2-1.

4 PANS, RE56, unpaginated, "Supplementary Report and Estimate . . . ," 31 March 1846.

5 PAC, MG12, WO55, Vol. 880, fols. 940–3, "Supplementary Estimate . . . ." 31 March 1846.
6 Ibid.
7 PANS, RE56, unpaginated, No. 792, Matson to Calder, 6 May 1846, enclosing IGF's remarks.
8 PAC, MG12, WO55, Vol. 880, fols. 912–3, "Armament Proposal for Fort George . . . ," 21 July 1846.
9 Ibid., fol. 914, Director General of Artillery to Burgoyne, 15 Sept. 1846.
10 Ibid., fol. 912, Butler (for Byham) to Burgoyne, 2 Oct. 1846.
11 PAC, RG8, C series, Vol. 1445, pp. 56–62, "Report and Estimate for roofing over the Cavalier . . . ," 21 June 1855, and PAC, MG12, WO55, Vol. 880, fols. 940–3, "Supplementary Estimate . . . ," 31 March 1846.
12 John Joseph Greenough, op. cit., part 2, Fig. 92.
13 PAC, MG12, WO55, Vol. 880, fols. 940–3, "Supplementary Estimate . . . ." 31 March 1846, and NHPS, plan 13-1846-3-4.
14 PAC, MG12, WO55, Vol. 880, fols. 935–58, "Supplementary Report . . . .' 31 March 1846, and NHPS, plan 26-1846-3-16.
15 PAC, MG12, WO55, Vol. 880, fols. 935–58, "Supplementary Report . . . ." 31 March 1846, item 17.
16 Ibid., fols. 912–3, "Armament Proposal . . . ," 21 July 1846.
17 Ibid., fols. 978–99, partly revised version of supplementary estimate, n.d.
18 Ibid., fols. 935–58, "Supplementary Report . . . ," 31 March 1846.
19 NHPS, plan 01-1852-4-1.
20 NHPS, plan 26-1846-3-15.
21 NHPS, plan 01-1852-4-1.
22 Ibid.
23 NHPS, plans 26-1849-13-1 and 13-2.
24 PAC, MG12, WO55, Vol. 880, fols. 935–58, "Supplementary Report . . . ." 31 March 1846.
25 NHPS, plan 26-1849-13-1.
26 J. Rippengale, op. cit., p. 4.
27 PAC, MG12, WO55, Vol. 1558, part 7, "Observations on the Defence of Nova Scotia . . . ," 1856.
28 Ibid.
29 Ibid.
30 Ibid.
31 John Joseph Greenough, op. cit., part 2, Fig. 92.
32 Ibid., Fig. 98.

Select Bibliography

Akins, Thomas Beamish
"History of Halifax City." *Collections of the Nova Scotia Historical Society*, Vol. 8 (1892–94). Halifax.

Baker, Raymond F.
"The Early Citadels at Halifax." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1966.

Bourne, Kenneth
Britain and the Balance of Power in British North America, 1815–1908. University of California Press, Berkeley and Los Angeles, 1967.

Burgoyne, Sir John Fox
"Memorandum on the Increased Power of Breaching to be Obtained by the Use of Rifled Ordnance." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 10 (1861), pp. 1–7. Chatham.
The Military Opinions of General Sir John Fox Burgoyne. Ed. Capt. George Wrottesley, R. Bentley, London, 1859.

Canada. Department of Indian and Northern Affairs. National Historic Parks and Sites Branch.
"Report on Restoration of the Halifax Citadel (Fort George) Prepared at the Request of the Royal Commission on National Development in the Arts, Letters and Sciences." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1950.

Canada. Public Archives.
MG12, B, WO44, War Office Papers, Ordnance Office In-Letters, 1812–55, Vols. 198–238, Nova Scotia, 1825–55.
MG12, B, WO55, War Office Papers, Ordnance Miscellanea, especially Vols. 862–87, Engineer Papers, 1825–56, and Vol. 1558, sections 5, 6 and 7.
RG8, 1, C series, British Military and Naval Records, especially Vols. 1338–47, Military Correspondence, Nova Scotia command, 1820–26; Vol. 1348, Military Secretary's confidential letterbook, Nova Scotia command, 1851–71; Vol. 1348A, confidential letterbooks, Nova

Scotia command, 1862–90; Vols. 1355–71, Military Correspondence, Nova Scotia command, 1827–70; Vols. 1376–84, Military Correspondence, Halifax command, 1862–70; Vols. 1429–31, letterbook, Royal Engineers office, Halifax, 1855–65; Vols. 1435–7, letterbooks, Royal Engineers office, Halifax, letters to the Inspector General of Fortifications, 1857–66; Vol. 1444, reports and estimates, Royal Engineers office, Halifax, 1842–49; Vol. 1445, special estimates and abstracts of annual estimates, 1840–65; Vol. 1447, letterbook, letters relating to land; Vol. 1448, Land Book, Royal Engineers Office, Halifax, 1837–73; Vol. 1449, memoranda relating to tenders, 1857–64; Vols. 1527–8, letters from England, Halifax, 1849–57; Vols. 1648–9, Fortifications, English letters, Nova Scotia command, 1858–63; Vols. 1650–1, Fortifications, local letters, Nova Scotia command, 1858–65; Vol. 1653, Fortifications and barracks estimates, 1843–44; Vol. 1653A, Fortifications and civil buildings estimates, 1859–70; Vol. 1654, inspectional report, 1962–63; Vol. 1655, letters from England, 1866–67; Vol. 1823, War department lands in Nova Scotia, 1855–64; Vol. 1825, Royal Engineers, Halifax and out-stations, letters received, 1847–51; Vols. 1839–40, letters from the Ordnance department, 1850–56. RG8, II, Ordnance records, especially Vols. 6, parts 1 and 2, commissioners' report, 1825 (Smyth Report); Vol. 18, commissioners' report on the defence of Canada, 1862; Vol. 20, Jervois report on the defence of Canada, 1864; Vol. 86, Jervois report on the defence of British naval stations in North America, 1864.

Clode, Charles Mathew
Military Forces of the Crown; Their Administration and Government. John Murray, London, 1869. 2 vols.

Coleman, Karalee
"Excavation Report: Halifax Citadel Moat, Site 2B." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1965.

Cruikshank, Ernest Alexander
Inventory of Military Documents in the Canadian Archives. King's Printer, Ottawa, 1910.

Dictionary of Canadian Biography
University of Toronto Press, Toronto, 1966–. Vol. 10 (1871–80).

Dictionary of National Biography
Ed. Leslie Stephen. Smith Elder, London, 1885–1900. 58 vols. Vols. 11 and 14.

Douglas, Sir Howard
Observations on Modern Systems of Fortifications Including that Proposed by M. Carnot, and a Comparison of the Polygonal with the Bastion System; to which are added, Some Reflections on Intrenched Positions, and a Tract on the Naval, Littoral, and Internal Defence of England. John Murray, London, 1859.

Duncan, Francis
History of the Royal Regiment of Artillery. Compiled from the Original Records. John Murray, London, 1879. 2 vols.

Edwards, R. F., comp. and ed.
Roll of Officers of the Corps of Royal Engineers from 1660 to 1898. Compiled from the Ms Rolls of the Late Captain T. W. J. Connolly, R.E. and Brought Up to Date in the Office of the R.E. Institute, Chatham. Royal Engineers Institute, Chatham, 1898.

Forbes, Archibald
A History of the Army Ordnance Services. Medici Society, London, 1929. 3 vols.

Fortescue, John William
A History of the British Army. 2d ed. Macmillan, London and New York, 1910. 13 vols.

Graham, Gerald S.
Empire of the North Atlantic; The Maritime Struggle for North America. University of Toronto Press, Toronto, 1950.

Great Britain. Army. Corps of Royal Engineers.
Aide-Memoire to the Military Sciences. Framed from Contributions of Officers of the Different Services. J. Weale, London, 1846–52. 6 vols.
Corps Papers, and Memoirs on Military Subjects; Compiled from Contributions of the Officers of the Royal Engineers and the East India Company's Engineers. 3rd Series. J. Weale, London, 1849–50.
Papers on Subjects Connected with the Duties of the Corps of Royal Engineers. 2d ed. J. Weale, London, 1844. 10 vols.
Papers on Subjects Connected with the Duties of the Corps of Royal Engineers, n.s. J. Weale, London and Woolwich, 1851–76. 23 vols.

Great Britain. Parliament. House of Commons, Journals.
Journals of the House of Commons. 1828. Vol. 83. H.M.S.O., London, 1828.

Great Britain. Parliament. Parliamentary Debates.
The Parliamentary Debates: Forming a Continuation of the Work Entitled "The Parliamentary History of England, from the Earliest Period to the Year 1803." T. Hansard, London, 1803–47.

Great Britain. Parliament. Parliamentary Papers.
Reports from Committees. . . . , 1828, Vol. 5. H.M.S.O., London, 1828.

Great Britain. Public Record Office.
WO47, minute books of the Board of Ordnance, Vols. 1434 and 1530; WO49, accounts, Vol. 2, part 1.

Haliburton, Thomas Chandler
An Historical and Statistical Account of Nova Scotia in Two Volumes. J. Howe, Halifax, 1829.

Hamilton, C. F.
"Defense, 1812–1912," in Adam Shortt and Sir Arthur George Doughty, eds., *Canada and its Provinces; A History of the Canadian People and Their Institutions, by One Hundred Associates.* Vol. 7, pp. 379–471. Edinburgh University Press for the Publishers' Association of Canada, Toronto, 1913–15. 23 vols.

Harvey, D. C.
"Halifax, 1749–1949." *Canadian Geographical Journal*, Vol. 38 (1949), pp. 6–37. Ottawa.

Headlam, John Emerson Wharton and Sir Charles Callwell
History of the Royal Artillery. Royal Artillery Institution, Woolwich [1931–40]. 3 vols.

Hitsman, John Mackay
Safeguarding Canada, 1763–1871. University of Toronto Press, Toronto, 1968.

Hughes, Basil Perronet
British Smooth-Bore Artillery: The Muzzle-Loading Artillery of the 18th and 19th Centuries. Arms and Armour Press, London, 1969.

Jervois, William Francis Drummond
"Observations Relating to the Works in Progress and Proposed for the Defence of the Naval Ports, Arsenals and Dockyards." *Papers on Subjects Relating to the Duties of the Corps of Royal Engineers*, n.s., Vol. 9 (1860), pp. 129–36. Chatham.

Jebb, Sir Joshua
Practical Treatise on Strengthening and Defending Outposts, Villages, Houses, Bridges, etc., in Reference to the Duties of Officers in Command of Picquets, as Laid Down in the Field Exercise and Evolutions of the Army by [*J.*] *Jebb*. 5th ed. William Clowes and Sons, London, 1857.

Lane, Richard B.
"Report of the Salvage Archaeology in the Area of the Redan During January and February of 1965." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1965.

Longford, Elizabeth Harman Pakenham, Countess of
Wellington: Pillar of State. Weidenfeld and Nicolsón, London, 1972.

Monroe, George
"Signal Mast, Halifax Citadel." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1938.

Muller, John
A Treatise Containing the Elementary Part of Fortification, Regular and Irregular. With Remarks on the Construction of the Most Celebrated Authors. J. Nourse, London, 1746. Reprinted by Museum Restoration Service, Ottawa, 1968.
A Treatise of Artillery: . . To Which is Prefixed an Introduction with a Theory of Powder Applied to Fire-Arms. 3rd ed. John Millan, Whitehall, 1780. Reprinted by Museum Restoration Service, Ottawa, 1965.

Nelson, Richard John
"Discussion and Project for an Enceinte." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 1 (1851), pp. 14–20. Chatham.
"Fragments of the Composition and Construction of Military Reports." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 7 (1858), pp. 73–80. Chatham.
"Syllabus of the Studies, Duties, &c., of an Officer of the Royal Engineers . . . ." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 7 (1858), pp. 130–3. Chatham.

Nova Scotia. Public Archives.
Royal Engineer Papers, Nova Scotia Command, especially RE8 through RE13, letter-books, English correspondence, 1826–58; RE17-23, Ordnance letters, 1824–58; RE24-7, numbered correspondence from the Fortifications department, 1826–55; RE28-33, local correspondence, 1826–55; RE54, Citadel correspondence, 1825–43; RE55, Citadel accounts, 1828–48; RE56, Citadel correspondence and estimates, 1835–47.

Oldfield, John
"Memorandum on the Use of Asphalte. Communicated by Col. Oldfield, Royal Engineers." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 3 (1853), pp. 132–48. London.

Philpotts, Henry
"Copy of a Report on the Demolition of the old Magazine in the Citadel of Halifax, Nova Scotia, on the 7th of April, 1847 . . . ." *Corps Papers, and Memoirs on Military Subjects, compiled from Contributions of the Officers of The Royal Engineers and the East India Company's Engineers*, 3rd Series. Vol. 1 (1849–50), pp. 214–6. London.

Piers, Harry
The Evolution of the Halifax Fortress: 1749–1928. Rev. ed. Public Archives of Nova Scotia, Halifax, 1947.

Raddall, Thomas H.
Halifax: Warden of the North. McClelland and Stewart, Toronto, 1948.

Raudzens, George Karl
"The British Ordnance Department." Unpublished doctoral dissertation, Yale University, New Haven, 1970.

Roppingale, John
"Gun Equipment, Halifax Citadel." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, n.d.

Rivington's Notes on Building Construction Arranged to Meet the Requirement of the Syllabus of the Science and Art Department of the Committee of Cultural Education, South Kensington.
2d ed. Rivington's, London, 1889. 4 vols.

Ross, Archibald
"Report on the Siege Operations Carried on at Juliers in September 1860, for the Instruction of the Prussian Army, Especially with Reference to Rifled Guns." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers*, n.s., Vol. 10 (1861), pp. 159–72. Chatham.

Rudyerd, C. W.
Course of Artillery at the Royal Military Academy as Established by His Grace the Duke of Richmond Master General of His Majesty's Ordnance &c. &c. &c. N.p., n.p., 1793. Reprinted by Museum Restoration Service, Ottawa, 1970.

Smyth, Sir James Carmichael
Precis of the Wars in Canada, from 1755 to the Treaty of Ghent in 1814. With Military and Political Reflections. Ed. Sir James Carmichael. Tinsley Brothers, London, 1862.

Stacey, Charles Perry
"Britain's Withdrawal from North America, 1864–71." *Canadian Historical Review,* Vol. 36 (1955), pp. 185–98. Toronto.
Canada and the British Army, 1846–1871: A Study in the Practice of Responsible Government. Longmans, Green, London and New York, 1936.
The Military Problems of Canada: A Survey of Defence Policies and Strategic Conditions Past and Present. Ryerson, Toronto, [1940].

Stokes, P. D.
"Report, Halifax Citadel Officers' Quarters Casemates." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, n.d.

Straith, Hector
Introductory Essay to the Study of Fortification for Young Officers of the Army. William Allen, London, 1857.

Talman, James J.
"A Secret Military Document, 1825." *American Historical Review,* Vol. 38 (1932–33), pp. 295–300.

The Annual Register, or A View of the History, Politics and Literature, for the year. . . .
J. Dodsley, London, 1758–19–. 81 vols. 1792, 1815, 1819–36.

The Royal Military Calendar, or Army Service and Commission Book. Containing the Services and Progress of Promotion of the Generals, Lieutenant-Generals, Major-Generals, Colonels, Lieutenant-Colonels, and Majors of the Army, According to Seniority: With Details of the Principal Military Events of the Last Century.
Ed. John Philippart. 3rd ed. A. J. Valphy (printer) and T. Egerton, London, 1820. 5 vols.

Tyler, H.
"Remarks on Fortifications; With Especial Reference to Rifled Weapons." *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers,* n.s., Vol. 9 (1860), pp. 85–107.

Wellington, Arthur Wellesley, 1st Duke of
Despatches, Correspondence, and Memoranda of Field Marshal Arthur, Duke of Wellington, K.G., ed. by his Son, the Duke of Wellington, K. G. J. Murray, London, 1867–80. 8 vols.

Whitfield, Carol M.
"Desertion – That Disgraceful Crime: A Study of a Problem Affecting the British Army in North America, 1815–1865." Paper delivered to the Canadian Historical Association, 1974.

Wilson, A. E.
"Halifax Citadel: Tunnel at West Ravelin, Operation 2B8." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1967.
"Salvage Excavation at Halifax Citadel, Tunnel at West Ravelin." Manuscript on file, National Historic Parks and Sites Branch, Ottawa, 1967.

Woodward, Llewellyn
The Age of Reform, 1815–1870. 2d ed. Clarendon Press, Oxford, 1962.

Woods, Nicholas Augustus
The Prince of Wales in Canada and the United States. Bradbury and Evans, London, 1861.

Canadian Historic Sites: Occasional Papers in Archaeology and History

Lieux historiques canadiens: Cahiers d'archéologie et d'histoire

1 *Archaeological Investigations of the National Historic Sites Service, 1962-1966*, John H. Rick; *A Classification System for Glass Beads for the Use of Field Archaeologists*, K. E. and M. A. Kidd; *The Roma Settlement at Brudenell Point, Prince Edward Island*, Margaret Coleman. Reprinted 1974. $4.00

2 *Contributions from the Fortress of Louisbourg*–No. 1. *Archaeological Research at the Fortress of Louisbourg, 1961-1965*, Edward McM. Larrabee; *A "Rescue Excavation" at the Princess Half-bastion, Fortress of Louisbourg*, Bruce W. Fry; *An Archaeological Study of Clay Pipes from the King's Bastion, Fortress of Louisbourg*, Iain C. Walker. Out of print.

3 *Comparisons of the Faunal Remains from French and British Refuse Pits at Fort Michilimackinac: A Study in Changing Subsistence Patterns*, Charles E. Cleland; *The French in Gaspé, 1534 to 1760*, David Lee; *The Armstrong Mound on Rainy River, Ontario*, Walter A. Kenyon. $3.00

4 *A Brief History of Lower Fort Garry*, Dale Miquelon; *The Big House, Lower Fort Garry*, George C. Ingram; *Industrial and Agricultural Activities at Lower Fort Garry*, George C. Ingram; *The Sixth Regiment of Foot at Lower Fort Garry*, William R. Morrison; *The Second Battalion, Quebec Rifles, at Lower Fort Garry*, William R. Morrison. Out of print.

5 *Excavations at Lower Fort Garry, 1965-1967; A General Description of Excavations and Preliminary Discussions*, James V. Chism. $3.00

6 *A History of Rocky Mountain House*, Hugh A. Dempsey; *The Excavation and Historical Identification of Rocky Mountain House*, William C. Noble. $3.00

7 *Archaeological Investigations at Signal Hill, Newfoundland, 1965-66*, Edward B. Jelks. $3.00

8 *The Canals of Canada*, John P. Heisler. $5.00

9 *The Canadian Lighthouse*, Edward F. Bush; *Table Glass Excavated at Fort Amherst, Prince Edward Island*, Paul McNally; *Halifax Waterfront Buildings: An Historical Report*, Susan Buggey. $7.75

10 *The Architectural Heritage of the Rideau Corridor*, Barbara A. Humphreys; *Glassware Excavated at Fort Gaspereau, New Brunswick*, Jane E. Harris; *Commissioners of the Yukon, 1897-1918*, Edward F. Bush. $5.00

11 *The Battle of Queenston Heights*, Carol Whitfield; *A History of Fort George, Upper Canada*, Robert S. Allen; *The Battle of Châteauguay*, Victor J. H. Suthren. $5.00

12 *Contributions from the Fortress of Louisbourg* – No. 2 *Lime Preparation at 18th-Century Louisbourg*, Charles S. Lindsay; *Louisbourg Guardhouses*, Charles S. Lindsay; *A Survey of Louisbourg Gunflints*, T. M. Hamilton and Bruce W. Fry. $5.00

13 *All That Glitters: A Memorial to Ottawa's Capitol Theatre and its Predecessors*, Hilary Russell; *Glassware Excavated at Beaubassin, Nova Scotia*, Jane E. Harris; *Sir Sam Hughes (1853-1921)*, Carol Whitfield. $6.50

14 *The British Indian Department and the Frontier in North America, 1755-1830*, Robert S. Allen; *The B.C. Mills Prefabricated System: The Emergence of Ready-made Buildings in Western Canada*, G. E. Mills and D. W. Holdsworth $5.75

15 *A History of Martello Towers in the Defence of British North America, 1796-1871*, Ivan J. Saunders; *Report of the 1972 Archaeological Excavations of the Market Shoal Tower, Kingston, Ontario*, Donald A. Harris. $6.75

16 *The Battle of the Restigouche*, Judith Beattie and Bernard Pothier; *Table Glass from the Wreck of Machault*, Paul McNally; *The Western European Coarse Earthenwares from the Wreck of the* Machault, K. J. Barton; *The Cochrane Ranch*, William Naftel. $5.00